REGIONAL PLANNING FOR SOCIO-ECONOMIC DEVELOPMENT IN MALDA DISTRICT

ABSTRACT
THESIS

SUBMITTED FOR THE AWARD OF THE DEGREE OF

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By
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Under the Supervision of
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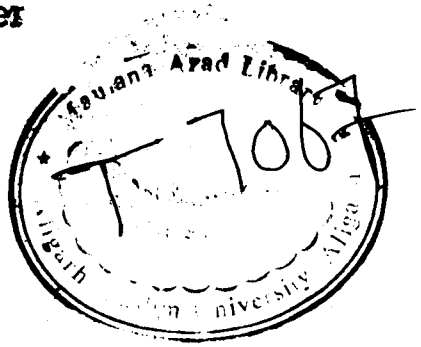

ABSTRACT

Planning is a device to achieve developmental goals aiming at the implementation of several specific targets. It is formulated for and implemented in a particular region having a defined administrative boundary. The main problem in front of planners is the regional inequalities and imbalances in the course of socio-economic development, which is a universal phenomenon. In the underdeveloped and developing countries like India this problem is bound to exist at a much larger scale.

Since the initiation of planning in India, it was highly centralized being formulated at centre by the planning commission for the entire country. But sectoral macro-level approach could not achieve success at reducing the mass poverty, unemployment and inter and intra regional disparities as well as human group disparities in the country. Such failures occurred due to the ignorance of investigation of the local need and local resource base of the backward regions and backward sections of the society. The Fourth Five Year plan has marked a historic departure from centralized plan to district level plan. Consequently, the idea of decentralization of Indian planning process has come up and the idea of micro-level regional planning got emphasized and many exercises are being done to achieve planning objectives. Thus, the problems were recognized but no serious attempts were made at regional level. In such a situation, there is an urgent need of micro-regional planning to achieve the goal of balanced regional socio-economic development in the country. Therefore, the need of micro-level planning or grass root level planning arises to take care of what sectoral plans failed to accomplish.

Malda district- study area is socio-economically one of the lagged behind districts in the state of West Bengal. It is inflicted with dire socio-economic and cultural disparities at district and block level as well caused by the unplanned distribution of socio-economic facilities and amenities. However, the government provided facilities for the development of agriculture, education, medical, transport

and communication which is no longer sufficient to keep pace with the alarming growth of population.

STUDY AREA

Malda district- study area is socio-economically one of the lagged behind districts in the state of West Bengal. It lies within the latitudinal and longitudinal extension of 24°40′ 20″ to 25°32′08″ North and 87°45′50″ to 88°28′10″ East respectively. The district accounts for a total population of 3,290,468 persons and recorded 24.78 percent growth of population during 1991-2001 against the state average 17.77 percent (Census of India 2001). Of the total population, 7.32 percent resides in urban centres against the state average 27.97 percent. The study area registered literacy rate of 50.28 percent, while that of the state is 68.64 percent. Illiteracy, poverty, unemployment and poor urbanization are characteristic features of the district. In view of the existing problems, in the present research work, an attempt has been made to formulate a diagnostic micro-level planning model in order to achieve the goal of balanced regional socio-economic development in the district.

OBJECTIVES

The important objectives are as follows;

i) to examine the physico-cultural and socio-economic factors affecting the spatial system of settlements,

ii) to analyse the spatial variation of the settlement in terms of size, spacing, concentration and dispersion,

iii) to analyse the spatial patterns of socio-economic facilities,

iv) to measure the levels of regional disparities pertaining to socio-economic development at district and block level both,

v) to identify the level of central places and its hierarchical arrangement,

vi) identification of spatio-functional gaps of central places based on the delineation of complementary region, and

vii) to propose a diagnostic planning model to achieve balanced regional development in the study area till plan period 2021.

HYPOTHESES

The following hypotheses have been formulated to infer the facts;

i) spacing is the function of size of settlements,

ii) availability of socio-economic facilities is the function of size of population of settlements,

iii) centrality score of central places is directly proportion to its population, and

iv) centrality score of central places is positively correlated to its dependent population and dependent area.

DATA BASE AND METHODOLOGY

The methodological principles adopted for the study is based on primary and secondary sources of data obtained from conducting field survey and visiting various offices and agencies. All the statistics are meant for the year 2001. The secondary data has been used to analyse the spatial organization of settlements, distribution of facilities and to arrange the central places in hierarchical order at district level whereas the primary data has been used to delineate the complementary region and to find out the spatio-functional gaps at block level.

The spatial variations of settlements and socio-economic facilities have been examined using the standard statistical techniques as follows;

- The model of Nearest Neighbour Analysis (N-N Index);

$$Rn = \frac{do}{de}, \quad \text{and} \quad de = \frac{1}{2\sqrt{N/A}}$$

Where, Rn = Nearest Neighbour Index,

do = mean observed distance of nearest neighbour settlements,

de = mean expected distance of settlements,

N = total number of settlements,

A = total area of the study region.

N N Scale: Rn = 0 is clustered pattern,

Rn = 1.0 is random pattern and

Rn = 2.5 is uniform pattern.

Mather's model of Mean Spacing;

$$D = 1.0746 \sqrt{A/N}$$

Where, D = theoretical distance between points or settlements in hexagonal arrangement, or mean spacing in unit length.

A = area of given region

N = number of settlement in a given region

1.0746 = Spacing constant.

'Gini's Coefficient of Concentration' model;

$$Gi = \frac{1}{10,000} \sum_{i-1}^{N} (x_i.y_i+1) - (x_i+1.y_i)$$

Where, x_i = the cumulative percentage distribution of attribute x.

y_i = the cumulative percentage distribution of attribute y.

N = the number of observations.

Gi = Gini's Coefficient Ratio

Scale of Gi Ratio:

Gi =Zero, is uniform distribution

Gi =1.0, is highest concentration.

The causal relationship between dependent and independent variables has been examined using Karl Pearson's technique of correlation of coefficient and linear regression. In order to test the hypotheses and to find out the level of significance of their correlation student's 't' test has been used.

Regional disparities in the levels of socio-economic development have been examined using Z-score and composite mean Z-score techniques as follows;

The model of Z-score is thus,

$$Zi = \frac{Xi - \overline{X}}{\delta}$$

Where, Zi is the standard score or Z-score of ith variable,

Xi is the individual observation,

$\overline{X}$ is the mean of variable, and

δ denotes standard deviation.

- The model of Composite Mean Z-score is thus,

$$C.S. = \frac{\sum Zij}{N}$$

Where, C.S. refers to the Composite Mean Z-score,

Zij is Z-score of an indicator j in block i, and

N denotes the number of variables.

Productivity of each crop has been computed based on current price index announced by the Gov't of India in order to give the same weightage of each one. The value of each crop viz., food grain crops and commercial one have been standardized using mean and standard deviation technique to delineate the productivity region.

Median Population Threshold (MPT) of each facility has been determined using modified 'Reed-Muench' method. The weightage value of facilities is obtained by assigning arbitrarily 1 to the lowest order facility and next to it is obtained by dividing their MPT by the lowest MPT value of facility. The centrality score or functional gravity of central place is the representation of total weightage value of facilities provided by the central place. Based on the centrality score, central places have been arranged in hierarchical order.

The complementary region or hinterland of central places has been delineated using modified quantitative technique devised by V.L.S. Prakash Rao and empirical observation pertaining to the traveling behaviour of consumer to the respective central place of the region to obtain goods and services.

- Mathematical equation of method devised by V.L.S. Prakash Rao, is as follows;

$$S.I. = TCA/C$$

$$R = \sqrt{TCA/C}$$

Where, S.I. = Sphere of Influence of central place (in sq. km.)

TC = Total Centrality score of central place,

A = Total area (Sq. km) of the study region,

C = Total centrality score of all central places, and

R = Radius of circle indicating the sphere of influence (in km.)

The spatio-functional gaps between the complementary region and the study area as a whole of all the facilities have been determined using simple arithmetic technique as follows;

$$R_{ij} = \frac{P}{P_1} \times \frac{F_1}{F}$$

Where, R_{ij} = relative level of function between complementary region and study area,

P = the population of study area (Malda district) as a whole,

P_1 = the population of central place and its complementary region,

F_1= total centrality score of ith function of central place and its complementary region,

F = total centrality score of ith function of Malda district as a whole.

When the ratio of functions within the complementary region to the study region as a whole is more than 01 the area is supposed to be adequately served, while the ratio less than 01 refers to the region is inadequately served. Again, the ratio highly near to '0' indicate higher functional gap, while ratio moving from '0' to 01 explain functional gap is reducing.

The functional gap for the year 2021 has been estimated based on the arithmetic equation of population projection as following;

$$PP = P_1 + (r \times t)$$

$$r = (P_2 - P_1) / 10$$

Where, PP = projected population,

P_1 = population of base year

P_2 = succeeding year of base year

r = annual increase of population between two consecutive years (i.e. P_1 and P_2)

t = time interval between the base year and the year of which projected population would be estimated.

ORGANIZATION OF THE WORK

The entire research work is divided into eight chapters. In an introductory part selection of area and topic, importance and significance of the study, work review, objectives of the study, hypotheses, data base and methodological principles are given.

Chapter-1 contains theoretical concept of regional planning and development.

Chapter-2 presents an account of physico-cultural and socio-economic characteristics of geographical dimension of the study area. The explanation of all these attributes is made to assess their effects on the spatial organisation and evolution of settlement system.

Chapter-3 explains the analysis of spatial variations of settlements in terms of area, population, size, spacing and concentration. It further deals with the causal relationship between spacing and size of settlements.

Chapter-4 is devoted to analyse the spatial distribution of existing socio-economic facilities in the district.

Chapter-5 deals with the analysis of existing regional imbalances in the levels of development pertaining to the socio-economic variables such as education, health, communication and transportation, market-electricity-drinking water, agro-economy, finance and veterinary and recreation.

Chapter-6 describes the basic concepts of central place theory and measures the Median Population Threshold (MPT) of each facility. Based on the computed MPT a certain weightage value has been assigned to each facility and composite of weightage score of all functions rendered by a settlement referred its centrality score. It further deals with the arrangement of central places in hierarchic order based on the centrality score. It also explains the nature and extent of relationship between the availability of socio-economic facilities and distribution of population among the size group of settlements and another relationship between centrality

score of central places and their total population.

Chapter-7 deals with the spatial analysis of settlements, socio-economic facilities and levels of socio-economic development at gram panchayat level in Harishchandrapur-II block (pilot study area). It further deals with the analysis of spatial interaction and organisation of central places in the case study block. Based on the consumer's movement to a particular central place to obtain the goods and services to sustain their needs, the complementary region or hinterland of each central place have been delineated in the same chapter. A causal relationship between centrality score of central places and their dependent population and dependent area, has been examined with correlation and linear regression technique.

The chapter-8 examines the existing spatio-functional gaps of each facility in 2001 and estimated to exist in 2021. It also proposes a diagnostic planning model suggesting required number of facilities and their optimal location in the pilot study block to achieve balanced regional socio-economic development in the district till plan period 2021.

Last part presents the summary of findings and some suggestions for balanced regional development at micro-level.

DISCUSSIONS

The significance of the study of spatial organization of settlements lies to the fact that the settlements are grown in haphazard manner in that proportions that services are facilitated inadequately. Therefore the regional planning at micro-level comes at the rescue for balanced regional development through providing the adequate facilities to the settlements. The analysis of spatial organization of settlement exhibits an uneven distribution of settlements in the district. Bamangola block has recorded highest density of settlements i.e., 6.8 settlements per 10 sq. km., but lowest average size of settlement i.e., 1.46 sq. km./settlement. However, Manikchak block has recorded lowest density settlements i.e., 2.3 settlements/10 sq.

km., but highest average size of settlement i.e., 4.39 sq. km/settlement. A wide variation in the distribution of population among different size group of settlement exists in the district i.e., 11.48 percent of settlements having population less than 250 persons accommodate only 0.87 percent of population, while 2.19 percent of settlements having population more than 10,000 persons accommodate more than 20 percent of population of the district. Highest 30.11 percent of total population is accommodated in 19.20 percent of settlements having population 2000 to 4999 persons in each. The Gini's coefficient ratio of 0.580 reveals that population in the district are almost disproportionately concentrated at few bigger size settlements. Settlements in the district are located at the mean spacing of 1.58 km., while highest (2.25 km.) and lowest (1.30 km.) mean spacing among settlements have been recorded in Manikchak and Bamangola block respectively. From the positive causal association between size and spacing of settlements (r= 0.5379) significant at 5 percent level, it may be ascertained that spacing is the function of size of settlements or bigger size settlements are located at higher distance to each other, while smaller size settlements are closely located.

Existing Problems in the Distribution of Facilities

- Unequal accessibility of socio-economic facilities to the size group of settlements.
- Regional disparities in the levels of socio-economic development.

Spatial analysis of socio-economic facilities reveals that most of them are not uniformly distributed among the settlements of different size groups. Among all the facilities under study, Electricity for Domestic Purpose (EDP) has recorded highest accessibility. The settlements having EDP are more closely located (i.e., 1.79 km. mean spacing) and approaching uniformly distributed among each size group of settlements in the district. However, Soil Testing Centre (STC) is mainly concentrated at single settlement and reveals inaccessibility to the people. It is observed that, higher lack of facility has been recorded among the smaller size settlements than bigger size settlements. It has been further observed that, as the

order of facility is increasing the lacking is subject to decrease and increase with the increasing and decreasing size of settlements respectively.

Unplanned allocation of socio-economic facilities led to the emergence of regional disparities in the levels of socio-economic development. In the district, Harishchandrapur-II block has recorded low level of development in each socio-economic sector (i.e., education, health, communication and transportation, market, electricity and drinking water, agro-economy, finance and veterinary, and recreation). After estimating the composite mean Z-score of all socio-economic facilities, Harishchandrapur-II block has been identified as socio-economically least developed one in the district followed by Kaliachak-III, however, English Bazar block stood at first rank followed by Chanchal-I. Within the boundary of least developed block (Harishchandrapur-II), wide regional imbalances in socio-economic development have been recorded. Sultan Nagar gram panchayat has been identified as socio-economically least developed one in Harishchandrapur-II block. In view of the least socio-economic development, Harishchandrapur-II block has been selected for case study in order to formulate a diagnostic micro-level planning model.

Planning Approach to Overcome the Existing Problems

Central Place model has been followed in the study as a tool of planning to overcome the existing problems. In 1933, Christaller envisaged the idea of Central Place which explains the laws governing the distribution and size of towns, the functions they perform and their arrangements. His concept is based on certain assumption of isotropic surface having uniform distribution of population, purchasing power, resources, and transport facilities. But it is difficult to find such a land, and Malda district is not an exception. Therefore, in the study, basic concepts of his model have been taken into consideration to carry out the different steps of planning procedure.

Basic concepts of central place model

- Centralisation as an ordering principle
- The central place

- Central functions
- Centrality of central place
- Complementary region of central place
- Range of goods and population threshold

Different steps of planning procedure

- Hierarchical arrangement of central places
- Delineation of complementary region
- Identification of spatio-functional gaps existing in 2001 and estimated to exist till 2021, and
- Proposal for a diagnostic location planning model - 2021.

On the basis of criteria being used, 361 settlements have been identified as central places which have been arranged into six hierarchical orders as per their centrality score. Of them, 274 central places have been considered in first order i.e., lowest order hierarchy, 71 in second order, 11 in third order, 03 in fourth order, 01 in fifth order and last 01 in sixth order i.e., the highest order hierarchy. It has been observed that the central places with higher centrality score contain larger population. But each central place provides services and facilities to the population of its own and its surrounding settlements leading to the emergence of an interaction pattern between the central place and its complementary region. For detail analysis, Harishchandrapur-II block has been taken for pilot study. In the block, 15 first order and 06 second order central places have been identified. Because of the problems associated with circular form of zone of influence of central places that delineated on the basis of V.L.S. Prakash Rao's quantitative method, it is difficult to measure the actual flow and volume of consumer to the respective central place to obtain goods and services. In view of this, the complementary region of central places has been delineated based on empirical observation and their dependent population and area has been estimated.

Through the field study, it has been observed that the settlements of Hulaspur, Chhatrak, Monaharpur, Jayrampur and Bildaha of Sultan Nagar gram panchayat do not come under the zone of influence of any central place in Harishchandrapur-II

block. Therefore, people of these areas are bound to move to the central place that lies outside the case study block to obtain goods and services. People of Hulaspur, Chhatrak and Monaharpur move to Tulshihata (third order central place) and people of Jayrampur and Bildaha move to Bhatol (first order central place) that lies in the nearby block i.e., Harishchandrapur-I. The estimation of dependent population and dependent area reveals the fact that the central places with higher centrality score attract larger population from larger distance, while central places with lower centrality attract lesser population from smaller distance.

Estimation of dependent population is the basis of identification of spatio-functional gap of facilities existing within the complementary region. Inadequacy of facility comes into being when dependent population in proportion to available facility within the complementary region is higher than that of the district average. Most of the complementary regions are inadequately served by each of the facilities existing in the block during 2001. The spatio-functional gap of facilities has been estimated for 2021 based on the projected population of each settlement in the pilot study area. The analysis reveals that, due to the estimated growth of population, the functional gap of each facility is estimated to be increasing that suggests the requirement of new more facilities in addition to existing number.

Proposed Planning Model - 2021

It comprises two folds planning action, are as;

- Estimation of required number of facilities
- Identification of optimal new location

The analysis reveals that, to keep pace with growth of population and to achieve balanced regional development, as many as 37 new primary schools, 04 middle schools, 01 secondary schools, 19 dispensaries, 03 branch post offices, 12 fare bus stops, 35 fertilizer distribution centres, 03 agricultural credit societies and 01 periodic market in addition to existing units have been proposed for Harishchandrapur-II block till the plan period 2021. In addition to existing settlements, telephone facility have been recommended for 10 more settlements, pucca road

facility for 19 settlements, electricity for domestic purpose for 29 settlements, electricity for agriculture for 15 settlements and tap water facility for 08 settlements till 2021 in the block.

On the basis of assessment of MPT of the facility, nearest neighbour distance, accessibility and connectivity of settlements, optimal location for the proposed facilities have been identified in the pilot study area so that facilities would be available to the maximum population within minimum distance. It is exhibited that, the Datian settlement (J.L. No. 139) of Sultan Nagar gram panchayat has been identified as the best location of as many as 12 new more facilities. Monaharpur settlement (J.L. No. 117) of the same Gram Panchayat has been identified as the best location of 09 new more facilities i.e., primary school, middle school, primary health sub-centre, dispensary, branch post office, fare bus stop, pucca road, tap water and fertilizer distribution centre. Both settlements will serve as central place with higher functional importance in near future, if all the proposed facilities are provided till the plan period.

The proposed plan has been formulated as a diagnostic model to eliminate the existing problems and problems likely to exist till 2021, is based at the grass root level. If this model is adopted by the regional planners and policy makers, the areas would be developed and a balanced regional development would be achieved within the target plan period.

Regional planners, policy makers and government are suggested to adopt this planning proposal as bottom-up approach for entire district in the same way and same process to eliminate existing regional disparities that top-down planning process could not achieve since the inception of national planning in India.

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Dedicated
to
My Beloved Parents

Mr. Sk. Mohiuddin Ahmad
&
Mrs. Sultana Begum

"Whose blessing, unending sacrifices and sincere efforts enabled me to reach upto this stage of my life"

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Certificate

This is to certify that **Mr. Md. Julfikar Ali** has pursued his research work and prepared the present thesis entitled **"Regional Planning for Socio-Economic Development in Malda District"** under my supervision and guidance. To the best of my knowledge and belief , this thesis is his original work and is being submitted to the Aligarh Muslim University, Aligarh for the award of the degree of doctor of philosophy.

Dr. Ateeque Ahmad
(Supervisor)

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Md. Julfikar Ali

(Md. Julfikar Ali)

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ABHC	Additional Block Animal Health Centre
ACS	Agricultural Credit Society
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ASDC	Agricultural Seed Distribution Centre
BAHC	Block Animal Health Centre
BHQ	Block Head Quarter
BMNL	Bamangola Block
BPO	Branch Post Office
BS	Bus Station
CB	Commercial Bank
CCB	Cooperative Commercial Bank
CCS	Cooperative Cold Store
C.D. Block	Community Development Block
C.f.	Cumulative frequency
CHCL-I	Chanchal-I Block
CHCL-II	Chanchal-II Block
C.I.	Composite Index
Cin.	Cinema Talkies
Col.	College
Contd.	Continued
CS	Composite Mean Z-Score
DHQ	District Head Quarter
Disp.	Dispensary
DM	Daily Market
Dy.	Deputy
EA	Electricity for Agriculture
EDP	Electricity for Domestic Purpose
ENGB	English Bazar Block
FBS	Fare Bus Stop
FDC	Fertilizer Distribution Centre

Fig.	Figure
FRR	Free Reading Room
GCA	Gross Cropped Area
Gi	Gini's Coefficient Concentration Ratio
GP	Gram Panchayat
GRI	Geographical Review of India
GZL	Gazole Block
HBPur	Habibpur Block
HC	Health Centre
HCPur-I	Harishchandrapur-I Block
HCPur-II	Harishchandrapur-II Block
Hos.	Hospital
HS	Higher Secondary School
IJRS	Indian Journal of Regional Science
J.L. No.	Jurisdiction List Number
KLK-I	Kaliachak-I Block
KLK-II	Kaliachak-II Block
KLK-III	Kaliachak-III Block
Km.	Kilometer
MNK	Manikchak
MPT	Median Population Threshold
MS	Middle School
NCA	Net Cropped Area
NH	Nursing Home
N-N	Nearest Neighbour
No.	Number
OLM	Old Malda
P	Projected Population
PHC	Primary Health Centre
PHSC	Primary Health Sub-Centre
PL	Public Library
PM	Periodic Market

Pop.	Population
PR	Pucca Road
Prk.	Park
PS	Primary School
P St.	Police Station
PT	Post and Telegraph
PTI	Professional Training Institute
Pub.	Publication
RM	Regulated Market
RWS	Railway Station
SAHC	State Animal Health Centre
SC	Settlement Curve (Cumulative Frequency Curve of Settlement)
SDO	Sub Division Office
Sett.	Settlement
Sl.	Serial
SPO	Sub Post Office
SS	Secondary School
STC	Soil Testing Centre
Tel.	Telephone
TW	Tap Water
$\overline{X}$	Mean
δ	Standard Deviation

INTRODUCTION

INTRODUCTION

Geography is the study of areal differentiation and areal association of the phenomena of earth. Earth is an inseparable part of organic whole. The symbiotic relationship of the phenomena is too complex to understand. To find out the laws inherent in its harmony of nature one has to look into the segment of earth or part of it. Thus the idea of regional concept comes in to being. In the initial stage, the analysis of regional phenomena was not so complex to understand because the interaction of man in environment was very simple. But gradually and slowly the pace of industrialisation, commercialisation, liberalisation and globalisation has brought radical transformation in their relationship to such an extent that becomes too dynamic and complex. The most significant aspect of regional studies is to identify region based on certain criteria under definite boundaries for planning and development. Some time it is happened that the movement of consumers and consumerable goods do not follow the range of goods because of improved socio-economic conditions, developed accessible infrastructure and social amenities and facilities. Therefore, the regional planning based on administrative boundary is not as much applicable as it had been considered earlier. To find out the ground reality of region regarding the functional behaviour of service centres and consumer's behaviour, an empirical observation is highly needed.

In common parlance planning is a device to achieve developmental goals aiming at the implementation of several specific targets. Planning is formulated for and implemented in a particular region. It is primarily a way of thinking about social and economic problems. Planning is oriented predominantly towards the future and is deeply concerned with the relation of goals to collective decisions, and strives for comprehensiveness in policy and program.[1] Planning is mainly designed to overcome the variety of regional problems relating to the distribution of developmental resources in an unorganised manner leading to the regional imbalances of socio-economic development. For the planning purposes, existence of administrative boundary of a region is imperative to collect data and for the implementation of developmental plan.[2] The objective of the attainment of balanced regional development has been a pride of place in planning for regional development. The idea of balanced regional development has been mooted as a

corrective process to eliminate the variations in the degree of socio-economic development in different parts of the country. Such variations are manifested in per capita income, employment pattern, living standard, household expenditure, extent of saving, education and social progress.[3] The variations are attributed to the existing physico-cultural and socio-economic diversities in the region. Any processes of development in such a region will not response uniformly instead of creating imbalance in the development subsequently, bear the burden of regional disparities. [4]

The problem of regional disparities is not new thing, it is as old as the British colonial period in India. During the British regime resources were allocated and industrialisation was made only in coastal areas like Calcutta (Kolkata), Bombay (Mumbai) and Madras (Chennai) for their easy accessibility by sea way transportation from their home country. Such industrialisation in certain pockets in the country led to the coming out of regional disparities. Again, the brain drain and resource drain led to intense regional disparities in the socio-economic development.

The attainment of balanced regional development has been one of the main aims of Indian planning. After independence, at the beginning of planning in India, it was centralized being formulated at the centre by planning commission for the entire country. Such centralized macro-level planning contributed to further wide regional disparities in socio-economic development. Macro level planning is also known as sectoral planning as different sectors were given greater emphasis. Up to 1970s, sectoral macro-level planning approach could not achieve success at reducing the mass poverty, unemployment and inter and intra regional disparities and human group disparities in the country. Such failure was consequent upon the ignorance of evaluating the local needs and local resource base of the backward regions and backward sections of the society. Macro-level sectoral plans promote only those regions where infrastructure was available for development but regions lacking such infrastructure did not attract growth impulses consequently, remained socio-economically backward. As a result regional disparities in socio-economic development became more intensive with time.

The Fourth Five Year Plan (1969-74) marked a historic departure from centralized plan to district level plan. Consequently, the idea of decentralization of Indian planning process has come up and the idea of micro-level regional planning got emphasized.[5] During the Fourth Five Year Plan it was suggested for the experimental studies on growth centres. Further, district level plan was decentralized into block level plan during the Sixth Five Year Plan (1980-85). Such decentralized planning process was an attempt to collect village requirements. But no serious attempts were made at regional level.

In view of the diverse problems in India relating to failure in target achievement of macro-level planning, rapid growth of population, rising prices, there is an urgent need of micro-regional planning in the country to overcome these problems and to achieve the goal of balanced regional socio-economic development. The need for micro-level planning or grass root level planning arises to take care of what sectoral plans failed to accomplish.

The micro-level planning is mainly concerned with the Integrated Area Development for those areas which are underdeveloped due to lack of certain social and economic activities prerequisite for development. The setting up of socio-economic and institutional framework is not sufficient for achieving growth and development unless they are dispersed spatially and linked properly.[6] The basic socio-economic functions prerequisite for development should directly and indirectly be integrated. In such an approach all the major functions like, education, health, transport and communications, agro-economy, industry, credit and marketing should be integrated. Some functions like education performs at various levels, i.e. primary school is the lowest level followed by high school, college and university. Since the settlements are found in hierarchical pattern, higher order functions should be located at higher order settlements while lower order functions at lower order settlements. The idea of integrated area development suggests a framework of decentralizing the socio-economic functions by locating them in appropriate settlements.

Malda district- study area is socio-economically one of the lagged behind districts in the state of West Bengal. It is inflicted with dire socio-economic and cultural disparities at district and block level as well. Regional disparities are

caused by the unplanned distribution of socio-economic amenities and facilities. However, the government provided facilities for the development of agriculture, education, medical, transport and communication which are neither located at appropriate settlement nor are sufficient to keep pace with the alarming growth of population. Subsequently, mass of illiteracy, poverty, unemployment becomes the common features of the region. The district accounts for 24.78 percent growth of population during 1991-2001 against the state average 17.77 percent. Of the total population, 7.32 percent live in urban centres in the district against the state average 27.97 percent. During 2001, district has registered the literacy rate of 50.28 percent, rural literacy rate of 47.76 percent and female literacy rate of 41.25 percent while that of 68.64 percent, 63.42 percent and 59.61 percent have been recorded in the state respectively.

Existence of sharp regional disparities in the levels of socio-economic development is an important feature of lower developed region like Malda district. For the purpose of reducing the existing problems and to achieve the goal of balanced regional socio-economic development, an attempt has been made to formulate a micro-level planning model.

The significance of the study lies to the fact that it enables to understand the local resource base, local needs and demands. District and block administrative unit has been taken as the unit of study for the convenience of planning purposes because of the availability of data and most of the assessment and implementative decisions are taken by the district administrative authorities. The analysis of levels of socio-economic development at block and gram panchayat level attract greater attention of planners towards achieving the goal of balanced regional development. The delineation of complementary region of central places helps in estimating the adequacy and inadequacy of existing facilities within the region. No doubt, the identification of functional gaps (ratio of functions between complementary region and district as a whole) helps planners and policy makers to determine the required number of facilities and their optimal location in achieving balanced regional socio-economic development. The present study provides a base for diagnostic planning model to reduce the existing disparities pertaining to socio-economic development.

WORK REVIEW

Studies on planning for regional development using suitable tools, techniques and models are inspired by the pioneering works of Von Thunen (1826)[7], Christaller (1933)[8] and Losch (1944)[9]. Most of the Indian geographers and social scientists pertaining to geographical studies are based on the derivative ideas of aforesaid scholars.

On the basis of philosophical essence of Christaller's central place theory, Wanmali (1970)[10] studied the hierarchy of central places and delineated their complementary region using socio-economic indicators. A report of 'pilot project' of the Ford Foundation (1973)[11] studied settlement planning for integrated area development with geographical approach.

Dahiya (1982)[12] adopted suitable models to analyse the direct and indirect effects of specified combination of policy instruments and constraints on several important aspect of economic behaviour like distribution of income and alleviation of poverty. Rao (1983)[13] tried to estimate the composite index of agricultural development at taluk level based on the technique of 'Principle Component Analysis'. Sundaram (1985)[14] based on holistic approach studied the socio-economic conditions and suggested that the countries like Malaysia, Indonesia, Thailand, Philippines and India experiences vast inter-regional disparities in resource development. Sita and Phadke (1985)[15] tried to identify the major trends of research in Indian settlement geography which appear to have emanated from the central place theory to understand the functional hierarchy of settlements. Tiwari (1985)[16] based on the technique of composite index, attempted to assess the existing scenario of inter-state disparities in the levels of development in India in temporal perspective and suggested to assign top priority for infrastructural development to remove it. Rao (1985)[17] attempted to analyse the extent of inter-state disparities in development measured in terms of per capita state domestic product. Maithini (1986)[18] used the principle of Christaller's central place theory to formulate a micro-level planning for socio-economic development. Rai (1988)[19] adopted Mather's model of mean spacing and 'Nearest-Neighbour Index' to study the spatial distribution of existing socio-economic facilities and tried to formulate a micro-level plan for the socio-economic development in rural areas. In order to

formulate a micro-level planning, Babu (1988)[20] made an endeavor to estimate the population threshold of socio-economic facilities, centrality score of central places and spatio-functional gaps of facilities and finally, recommended required socio-economic facilities to over come the inadequacy of existing facilities.

Samuel (1996)[21] based on composite index of ratio of population and facilities made an effort to assess the efficiency of infrastructure services and examined the levels of socio-economic development. Rao and Babu (1996)[22] adopted factor analysis method to assess the relative levels of socio-economic development and tried to identify the effective factors leading to socio-economic disparities across the region.

Besides the above works in the field of planning for regional development recorded in different books, some scholar's contributions are also found in different journals of academic excellence.

Deshmuk (1970)[23] studied various aspects of planning for socio-economic development and he, on the basis of Karl Pearson's technique of coefficient of correlation tried to assess the causal relationship between the size of population and socio-economic facilities. In view of the problem of micro-level planning for integrated area development, Pathak (1971)[24] emphasized on the importance of growth centres as economic growth foci through which growth impulses could be injected for area development. Wanmali (1972)[25] carried out a study on settlement system and tried to use the technique of correlation of coefficient to establish the fact that the clustering of services is the function of population distribution among the settlements of different size. Reddy (1972)[26] viewed the process of economic growth that involves the structural changes in the economy as well as concurrent changes in economic activities which suggests for the policy decisions relating to the location of activities, flow of benefits and the spatial functional linkages of economic activities in order to achieve the socio-economic development in the region. Rao (1977)[27] attempted to estimate the composite index of development of towns of different size class in order to identify the potential growth centres and finally suggested that the lower order town centres should be given first priority for planning purposes. Soen, Kipnis and Tamir (1977)[28], on the basis of 'Principle Component Analysis' technique tried to examine the levels of social development

in Northern Thailand and delineated homogenous regions for planning purposes. Finally, he arrived at the conclusion that, very large size and the heterogeneity of northern region made it necessary to subdivide into smaller units for formulation and implementation of developmental plan.

During 80's, a number of works in this field were contributed. Amani and Ansari (1982)[29] used standard statistical techniques to analyse the existing pattern of settlement and tried to correlate them with the levels of regional development. Routray (1984)[30] analysed the socio-economic conditions and suggested for various approaches for development of backward district. Betal (1984)[31] on the basis of statistical techniques i.e., co-ordinates of mean centre, standard distance and location quotient attempted to analyse the regional pattern of concentration of population and socio-economic facilities. Finally, he derived a composite index of all facilities to examine a correlation between the concentration of facilities and population in the districts under study. Zutshi (1988)[32] identified the existing service regions based on the spatial linkages of socio-economic and administrative functions, and tried to formulate a planning model for socio-economic development suggesting their optimal location.

Rai and Singh (1990)[33] estimated spatio-functional gap as the ratio of functions between complementary region and study area for integrated rural area development. Singh and Singh (1990)[34] attempted to identify the existing functional gaps in the locations of socio-economic activities in different settlements. Keeping in view the significance of developmental planning process in developing countries like India, Mishra, Mishra and Shukla (1991)[35] conducted an empirical observation to evaluate the adequacy and inadequacy of existing social infrastructure facilities and examined the requirements of facilities in order to promote its economic growth as well as social development. Finally he recommended the optimal location of social facilities to attain the overall regional development at grass root level. Sharma and Sharma (1993)[36] are of the opinion that the development blocks being not very close to the village are not ideal units for the formulation and implementation of developmental plans at grass root level therefore, the cluster of villages with a focal point may be considered as a basic and viable unit micro-level planning. Keeping in view, he attempted to identify the

central places, their spatial distribution and complementary region, and lastly proposed a planning policy to achieve balanced regional development at village level, so that maximum people can share its fruits. Singh (1994)[37] adopted the criteria of students in a class that appears to be conducive for a single teacher and minimum needs programme of Seventh Five Year Plan for the setting up of new educational and medical institutions respectively, for their easy and better accessibility to the people for all round regional development. Sharma, Tripathi and Gupta (1995)[38] tried to derive the coefficient of development of each social indicator and estimated composite index of development to examine the magnitude of disparities in the levels of social development. Mishra and Mishra (1996)[39] analysed the spatial pattern of medical facilities and assessed their adequacy in accordance to the growth of population and their needs, and finally proposed a spatial plan to eradicate the problems of rural health and hygiene, so that the people of the rural areas may also contribute to accelerating the process of rural development and socio-economic transformation. In view of the importance of district level planning or planning from below in order to overcome the existing disparities in socio-economic development, Joshi (1998)[40] attempted to highlight the position of the level of development of each sixty-three district in each selected indicators at two points of time i.e., 1980-81 and 1991-92. Dadibhavi (1998)[41] in order to assess the regional disparities in socio-economic development between North-Karnataka and South-Karnataka, used per capita income as a measure of development which sometimes become fail to reflect the fact. To overcome this deficiency, on the basis of Principle Component Analysis, he estimated the composite index of development for each district under study. Saxena and Sahoo (1998)[42] examined the impact of major infrastructures on output, income and employment generation on the economy in Kanpur.

Pawar and Lokhande (2000)[43] analysed the spatial distribution of market centres and correlated it with the demographic and agricultural determinants. Mallikarjun (2000)[44] used (i) simple averaging method, (ii) taxonomic method and (iii) principle component method to estimate the composite index of development and to highlight the regional disparities in socio-economic development. Durai, *et al.* (2000)[45] expressed an idea that in the developing countries like India, where

majority of the population lives in rural areas and depends on agriculture, rural roads act as catalyst for development of village as well as enhancement of inhabitant's life style. Mazumdar (2001)[46] using the multi-variate technique tried to analyse the impact of social infrastructure like education and health on the quality of life in particular and socio-economic development as a whole and viewed that social infrastructure are more effective than physical infrastructure in the socio-economic development of a region. Borbora and Mahanta (2002)[47] viewed agrarian sector had been the main reason for extreme regional variation in the levels of agricultural production in Assam. Nagia and Ahluwalia (2003)[48] made an attempt to arrange the urban settlements in hierarchical order on the basis of their composite centrality score. He estimated the centrality score based on types and number of existing functions provided by the settlement. Bharkar and Bhargava (2003)[49] carried out a study to examine the extent of disparities of infrastructure in Rajasthan. Pawar and Lokhande (2004)[50] analysed the spatial distribution of market centres and examined their relations with area, population of inhabited villages and net sown area to focus on the role of market centres on the levels of socio-economic development. Lokhande and Pawar (2004)[51] on the basis of Prakash Rao's modified method and Reilly's modified breaking point method, tried to delineate the service area of market centres to observe the served, poorly served and unserved areas. Ahmad and Ali (2005)[52] used standard statistical techniques to analyse the spatial pattern of settlement distribution in term of their size, spacing, concentration and dispersion and tried to establish the fact that the spacing is the function of size of settlements. Ali (2006)[53] attempted to analyse the spatio-temporal variations of agricultural crop productivity consequent upon the physico-cultural and socio-economic determinants and finally made a suggestive remark for the development of agriculture. Palanithurai (2006)[54] evaluated the efforts made by the state government in the initiation of the *panchayat* level planning for the development at grass root. Hassan (2007)[55] adopted 'Principle Component Analysis' and Composite Index methods to examine the regional inequalities in the infrastructural, industrial and agricultural development. Yasenovskiey and Hodgson (2007)[56] are of the opinion that the patrons always travel to the closets facility and that distance minimization best serves them. They

tried to combine the concepts and methods from hierarchical spatial system, spatial interaction modeling and location-allocation modeling to derive optimal hierarchical facility system. They finally presented a new model that incorporates a spatial choice interaction model attributing attendance and benefits to facility size, distance and neighborhood accessibility. Debapriya and Mohanty (2008)[57] comprehended the importance of education and health care facilities in the quality of life of people and tried to evolve a sound statistical methodology to measure the regional imbalances in the levels of educational and health care development.

OBJECTIVES OF THE STUDY

The objective of the present study is to examine the existing central place network and to identify their complementary regions with dependent population and area. For balanced regional development important objectives are as follows;

i) to examine the physico-cultural and socio-economic factors affecting the spatial system of settlements,

ii) to analyse the spatial variation of the settlement in terms of size, spacing, concentration and dispersion,

iii) to analyse the spatial patterns of socio-economic facilities,

iv) to measure the levels of regional disparities pertaining to socio-economic development at district and block level both,

v) to identify the level of central places and its hierarchical arrangement,

vi) identification of spatio-functional gaps of central places based on the delineation of complementary region, and

vii) to propose a diagnostic planning model to achieve balanced regional development in the study area till plan period 2021.

HYPOTHESES

The following hypotheses have been formulated to infer the ground reality and also to give a specific direction to the problems in the present study;

i) spacing is the function of size of settlements,

ii) availability of socio-economic facilities is the function of size of population of settlements,

iii) centrality score of central places is directly proportion to its population, and

iv) centrality score of central places is positively correlated to its dependent population and dependent area.

DATA BASE AND METHODOLOGY

The methodological principles adopted for the study is based on primary and secondary sources of data obtained from conducting field survey and visiting various offices and agencies such as Geological Survey of India, Bureau of Applied Economics and Statistics- West Bengal, Office of the Census of India, Office of the District Irrigation and Agriculture, District Library, District Head Post Office, Office of the District Animal Resource and Development and National Library- Kolkata. All the statistics are meant for the year 2001.

The secondary data have been used to analyse the spatial organisation of settlements, distribution of facilities and to arrange the central places in hierarchical order at district level whereas the primary data have been used to delineate the complementary region and to identify the spatio-functional gap of facilities.

Both the qualitative and quantitative methods have been used in the present study.

Physico-cultural and socio-economic factors have been described as a back ground to examine and assess their impact on the organisation of settlement system and their hierarchical development as well as regional disparities pertaining to socio-economic development.

To examine the distribution and spatial variation of settlements and socio-economic facilities standard statistical techniques like 'Nearest-Neighbour Index', 'Mather's model of mean spacing, Gini's technique of coefficient of concentration has been adopted.

- The model of Nearest Neighbour Analysis (N-N Index) is;

$$Rn = \frac{do}{de}, \quad \text{and} \quad de = \frac{1}{2\sqrt{N/A}}$$

Where, Rn = Nearest Neighbour Index,

do = mean observed distance of nearest neighbour settlements,

de = mean expected distance of settlements,

N = total number of settlements,

A = total area of the study region.

N N Scale: Rn = 0 is clustered pattern,

Rn = 1.0 is random pattern and

Rn = 2.5 is uniform pattern.

- Mather's model of Mean Spacing is as follows:

$$D = 1.0746 \sqrt{A/N}$$

Where, D = theoretical distance between points or settlements in hexagonal arrangement, or mean spacing in unit length.

A = area of given region

N = number of settlement in a given region

1.0746 = Spacing constant.

- The rule of computing 'Gini's Coefficient of Concentration' is as follows:

$$Gi = \frac{1}{10,000} \sum_{i-1}^{N} (x_i.y_i+1) - (x_i+1.y_i)$$

Where, x_i = the cumulative percentage distribution of attribute x.

y_i = the cumulative percentage distribution of attribute y.

N = the number of observations.

Gi = Gini's Coefficient Ratio.

Scale of Gi Ratio:

Gi =Zero, is uniform distribution

Gi =1.0, is highest concentration.

The causal relationship between dependent and independent variables has been analysed using Karl Pearson's technique of correlation of coefficient and linear regression technique. In order to test the hypotheses and to find out the level of significance of their correlation student's 't' test technique has been used.

Regional disparities in the levels of socio-economic development have been examined using Z-score or standard score technique. In this method each variable has got standardised. The scores measure the departure of individual observations, expressed in a comparable form. Based on the composite mean Z-score the index of development of each component areal unit has been estimated.

- The model of Z-score method is as follows :

$$Zi = \frac{Xi - \overline{X}}{\delta}$$

Where, Zi is the standard score or Z-score of ith variable,

Xi is the individual observation,

$\overline{X}$ is the mean of variable, and

δ denotes standard deviation.

- The model of Composite Mean Z-score is thus,

$$C.S. = \frac{\sum Zij}{N}$$

Where, C.S. refers to the Composite Mean Z-score,

Zij is Z-score of an indicator j in block i, and

N is the number of variables.

Productivity of each crop has been computed based on current price index announced by the Gov't of India in order to give the same weightage of each one. The value of each crop viz., food grain crops and commercial one have been standardised using mean and standard deviation technique to delineate the productivity region.

Median Population Threshold (MPT) of each facility has been estimated using modified 'Reed-Muench' method. The value of facilities is obtained by assigning arbitrarily weighatge value 1 to the lowest order facility and next to it is obtained by dividing their MPT by the lowest MPT value of facility. The centrality score or functional gravity of central place is the representation of total weightage value of facilities provided by the central place. Based on the functional gravity, the central places have been arranged in hierarchical order using mean and standard deviation (δ) technique. Mean value has been taken as standard limit below of which all central places fall in lowest order of hierarchy and above the mean value addition of the value of δ respective hierarchical orders of central places are made.

The complementary region or hinterland of central places has been delineated using the quantitative technique of V.L.S. Prakash Rao and empirical observation pertaining to the movement behaviour of consumer to the respective

central place of the region.

- Mathematical equation of method devised by V.L.S. Prakash Rao is as follows;

$$S.I. = TCA/C$$

$$R = \sqrt{TCA/C}$$

Where, S.I. = Sphere of Influence of central place (in sq. km.)

TC = Total Centrality score of central place,

A = Total area (Sq. km) of the study region,

C = Total centrality score of all central places, and

R = Radius of circle indicating the sphere of influence (in km.)

The spatio-functional gap of facilities between the complementary region and the study area as a whole has been determined using simple arithmetic technique viz., ratio of population between the complementary region and whole of the district is divided by the ratio of the composite facilities of the complementary region and the study area. The spatio-functional gap of facilities of all complementary regions has been identified based on the projected population of 2021 of each settlement of the case study area.

- The rule of computing spatio-functional gaps is as follows;

$$R_{ij} = \frac{P}{P_1} \times \frac{F_1}{F}$$

Where, R_{ij} = relative level of function between complementary region and study area,

P = the population of study area (Malda district) as a whole,

P_1 = the population of central place and its complementary region,

F_1= total centrality score of ith function of central place and its complementary region,

F = total centrality score of ith function of Malda district as a whole.

When the ratio of functions within the complementary region to the study region as a whole is more than 01, the area is supposed to be adequately served, while the ratio is less than 01, area is inadequately served. Again, the ratio highly near to '0' indicate higher functional gap while ratio moving from '0' to 01 explain functional gap is reducing.

- The model of computing projected population is as follows;

$$PP = P_1 + (r \times t)$$

$$r = (P_2 - P_1)/ 10$$

Where, PP = projected population,

P_1 = population of base year

P_2 = succeeding year of base year

r = annual increase of population between two consecutive years (i.e. P_1 and P_2)

t = time interval between the base year and the year of which projected population would be estimated.

SPATIAL UNITS OF STUDY

The unit of study of the present analysis is at macro, meso and micro level for the regional planning for socio-economic development. The administrative units like district, block, gram panchayat and village are considered for the analysis of necessary attributes. Aspects like, land use pattern, cropping pattern, decadal growth of population and settlements (1901-2001), changing sex-ratio (1901-2001) and changing literacy rate (1971-2001) have been analysed at district level. The levels of socio-economic development based on distribution of socio-economic facilities have been estimated at the block level as well as gram panchayat level. Finally, the diagnostic planning relating to the determination of optimal locations for required facility has been proposed at village level (micro level) grass root level.

CHAPTER SCHEME

In view of the aforesaid problems, objectives and methodological principles the present study has been organised under the following chapters.

The entire research work is divided into eight chapters. In an introductory part, selection of area and topic, importance and significance of the study, work review, objectives of the study, hypotheses, data base and methodological principles are given.

Chapter-1 contains theoretical concept of regional planning and development

Chapter-2 presents an account of physico-cultural and socio-economic characteristics of geographical dimension of the study area. The explanation of all these attributes is made to assess their effects on the spatial organisation and evolution of settlement system.

Chapter-3 explains the analysis of spatial variations of settlements in terms of area, population, size, spacing and concentration using standard statistical techniques. It further deals with the causal relationship between mean spacing and mean size of settlements.

Chapter-4 contains an analysis of spatial distribution of socio-economic facilities in the district.

Chapter-5 deals with the analysis of existing regional imbalances in the levels of socio-economic development at the district level. The levels of development of each variable viz., education, health, communication and transportation, market-electricity-drinking water, agro-economy, finance and veterinary and recreational development has been examined. The overall levels of regional disparities taking into account the composite index of all said variables pertaining to socio-economic development have been examined at block level. The analysis helps in ranking the component areal units in term of index of development.

Chapter-6 describes the basic concepts of central place theory and measures the Median Population Threshold (MPT) of each facility. Based on the computed MPT a certain weightage value has been assigned to each facility and composite of weightage score of all functions rendered by a settlement referred its centrality score. It further deals with the arrangement of central places in hierarchic order on the basis of centrality score. It also explains the nature and extent of relationship between the availability of socio-economic facilities and distribution of population among the size group of settlements and another relationship between centrality score of central places and their total population.

Chapter-7 deals with the spatial analysis of settlements, socio-economic facilities and levels of socio-economic development at gram panchayat level in Harishchandrapur-II block (pilot study area). It further deals with the analysis of spatial interaction and organisation of central places in the case study block. Based

on the consumer's movement to a particular central place to obtain the goods and services to sustain their needs, the complementary region of each central place have been delineated. A causal relationship between centrality score of central places and their dependent population and dependent area, has been quantified with simple correlation and linear regression technique.

Chapter-8 examines the existing spatio-functional gap of each function in 2001 and likely to exist in 2021 based on the projected population of the year 2021. It also proposes a diagnostic planning model suggesting required number of facilities and their optimal location in the pilot study area to achieve balanced regional socio-economic development in the district keeping pace with estimated increase of population till 2021.

Last part presents the summary of findings and conclusion for balanced regional development at micro-level in the district.

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CHAPTER – 1

CONCEPTUAL FRAMEWORK

CONCEPTUAL FRAMEWORK

1.1 CONCEPT OF REGION

The idea of region is linked with the subdivision of earth surface into different segments. When such a segment is distinguished from other one by its own identity having homogenous character is referred to a region which is specified by boundary and demarcated based on certain criteria.[1] The concept of region generally linked with space and has spatial dimension though it is sometimes used as something subjective or space less. Region is not an object either self determined or nature given, rather an intellectual concept, an entity for the purpose of thought, created by the selection of certain features that are relevant to an areal interest or problem and by the disregard of all features that are considered to be irrelevant.[2] The region is associated with nature and nature is always dynamic, so the concept of region is a dynamic not static one. Due to the dynamic nature of region, its delineation process is difficult task unlike the political or administrative regions. Thus regions are not actually exist, rather made of human intellectual based on certain criteria.[3]

Regional description was started with the writings of Strabo who explained about the configurations of earth surface and human adaptation in different geographic phenomena. Greeks gave the birth of the idea of regional geography. Travelers from different part of earth surface were coming in Greece for business purposes and explained about the land, climate and people of their home land.[4]

Eighteenth century gave a more exact and richer description of the region as the segment of earth surface were demarcated with clear boundaries and presented on maps. During this time instead of defining the originality of each geographic compartment by ethnographic features, there was an approach of perceptible realities of relief, rocks and types of life style. At the same time, the main weakness in the regional study was that the boundaries were concerned to be described not quantitative. The geographers of eighteenth century did not understand what to gain from the natural region rather their attempt were only descriptive. [5]

The nineteenth century witnessed the classical phase of regional geography. Alexander von Humboldt, at the beginning of this century seemed the importance of the division of earth surface into zones of latitude and longitude and impact of relief on climate and human activity, but he could not achieve regional analysis in which all those elements were integrated. But the philosophy of Vidal de la Blache was a decisive breakaway in the history of regional approach in geographical study. The idea of natural region became central. Geographers of the Videlian School of regional studies emphasised on the specific nature of areas referring to the dominant natural conditions and the life style of the inhabitants of that area. They gave prominence to the small unit of land which referred to as *Pays*[6] a distinctive assemblage based on the physical environment and its human response. Thus *Pays* was the representative of cultural landscape with more or less defined boundaries having distinctive characteristics. Thus during this period the regional analysis seemed to be the core of geographic discipline.

The success of regional concept in geographical study appeared to be total in the years following the First World War. Up to the industrial revolution in Europe, the concept of region was only a natural region representing the man-nature interaction. Such kind of region refers to the formal region which is a geographical area having homogenous in terms of selected criteria such as similar topography or climate, economic criteria such as similar per capita income level, similar production structure, similar consumption patterns, uniform employment situation etc..[7] The definition of such region may be in terms of single features or in terms of a well-defined association of several selected features. The concept of formal region was highly linked with the agrarian economy.

After the industrial revolution which was the land mark of transformation of economy from agrarian base to industrial base, the concept of region was also changed. Due to the industrialisation and urbanisation the concept of region became more complex. People and resources were tending to flow towards the focal point. Such kind of urban centre or nodal centre with high functional gravity represents the interdependence and interaction between the nodal centre and its surrounding area. Consequently, the

heterogeneity of phenomena emerged and formal region representing homogenous phenomena changed into functional region.

Functional region exhibits system of relation between the service centres and its hinter land. To understand the actual dependency of people on a particular nodal centre, the delineation of functional region is very essential. It has been observed that movement of the people does not conform to any administrative limit. Therefore, functional region is delineated using both the quantitative and qualitative techniques. Quantitative techniques give only the boundary of region but it can't give the actual flow and direction of people, goods and services. To understand the ground reality of flow and direction, interaction and interdependency the empirical observation is essential. Based on the consumers traveling pattern, the delineation of functional region is very much authentic, informative and significant for planning purposes. But due to the emerging needs of people and the development of transportation and communication people move further more distance to obtain goods and services. The boundary of functional region is not fixed rather it is more flexible.

Concept of Regionalization

Regionalization is the process of delineating regions. This process may take several forms depending on the purpose of regionalization, the criterion/criteria to be used and the availability of data. Systematic process of identification of regional unit and analysis of their spatial structure may be termed as regionalization.

Regionalization can also be defined as a means of arranging the number of points on the earth surface and to observe the uniformities and regularities of phenomena upon it and to establish definite theories, models, systems, and structure. It permits the application of statistical techniques for assessing data regarding spatial units and to help in the scientific establishment of the regional grid, which is the division of territory into integral parts. Regionalization has acquired key place in the spatial organisation of natural and social phenomena. Therefore, it should be made carefully with appropriate methods and techniques.

Before the industrial revolution, the purpose of delineation of region was to find out the homogeneity of phenomena. The delineation of homogenous region or

formal region was based on the selected criteria depending on the purpose of regionalization. The delineation of formal region involves the grouping together of local units which have similar characteristics according to certain clearly defined criteria, but differ significantly from units outside the region on the basis of the chosen criteria.[8]

The process of delineation of homogenous region is very simple if the criterion is simple like area with mean monthly temperature of more than 20°c. but the delineation of homogenous region become complex when it is delineated based on variety of criteria like rate of urbanization, irrigation intensity, cropping intensity, fertilizer consumption and crop productivity. In such cases several techniques are used to delineate formal regions.[9] Two more sophisticated techniques are, *the Weighted Index method* in which certain quantitative weights are assigned to the variables and homogenous regions are delineated based on mean and standard deviation technique. Another technique to delineate the homogenous region is the *Factor Analysis method* which is most significant to isolate the basic factors leading to regional variation of phenomena.

After the industrial revolution when the agrarian economy became industrial and commercial base the need of human beings also started rising up. To fulfill needs they started to move to a certain place where goods and services are available and where they can approach easily. Thus, the interaction and interdependence between the centre having goods and services and its surrounding area led to the heterogeneous phenomena. To understand the ground reality of actual dependency or heterogeneous phenomena the need of delineation of functional region came into being. The functional regionalization involves the grouping together of local units which display a considerable degree of interdependence. Delineation of functional is based on two basic approaches, one, *Flow Analysis* is used to demarcate regional boundary based on the direction and intensity of flow between dominant centre and its surrounding area. The boundary of functional region in this method, exhibit the minimum intensity of flow. The flow may be movement of people, goods, government expenditure, news paper circulation and telephonic call. *Gravitational*

Analysis is another approach which explains 'that the interaction between two centres is directly proportional to the 'mass' of the centres and inversely proportional to the 'distance' between the centre.'[10] 'By calculating the potential for the centres in a study area, contour lines of equal potential can be plotted on a map, illustrating the relative attractiveness, spheres of influence of the various centre. From such lines, functional regions can be identified.'[11]

Besides the formal and functional region, on the basis of territorial extension or scale of sizes three types of regions are as follows;

(i) Macro-Regions

Macro region is the biggest in size. It may be entire world, or entire country or entire state. Within the macro-region a high degree of mutual dependency exists, rather than ones with homogenous characteristics. In other words, each macro-region should be characterized by a high degree of internal cohesion, forming an economic system by itself and having the ability to generate exchanges between it and the other regions within the country. The macro region should possess a high degree of self-sufficiency in matters such as food, level of employment, and a potential ability to produce goods and services which can be exchanged with other areas in order to meet the tertiary needs of both rural and urban life.[12]

(ii) Meso-Regions

The meso-regions are the sub-divisions of macro regions. They really form the secondary economic units for the purpose of planning. If India as a whole country is seen as the macro-region the meso regions will be each state, or if whole the state of the country is assumed as the macro region its each district will be the meso region.

The main objective of delineating meso-region is to carve out viable areal units for the effective exploitation, conservation, and utilization of resources.[13]

(iii) Micro-Regions

It is the sub-division of meso-region. For example, if the district of a state is taken as the meso region, its each community development block would be micro-region.

At the micro-level, region should have some unifying problem or interest as a core. The areas within a micro-region should be characterized by absence of serious conflicting interests between them. Its population should share certain basic attitudes, values, needs and desires. The micro-region must be designed to present the dynamic types of production, market relationship, and supply of labour and demand. In this way, they will contain the best possible combination of structural, organizational, and functional factors.

For the better clarification of basic problems and requisition of socio-economic development and the basic needs of human beings, and also for the optimum utilization of local resource base, the micro-region is the best unit of study. Micro-region approach is more crucial in developmental planning as it provides more detail information of each and every aspect at local level, that can't meso region or macro region. Therefore micro-regions are considered as suitable units for the formulation, mechanization and implementation of regional developmental plans, as it is close to the grass roots and affording opportunities for direct interaction between the inhabitants and the administration in deciding the key issues related to area development.

1.2 CONCEPT OF PLANNING

Planning in any form cannot be dispensed with by any society aspiring to uplift the standards of living of its members. Almost all countries of the world have now adopted planning as a tool for socio-economic development. Planning is a contemplated process of thinking with the basic objective of socio-economic development. It implies a process of conscious and deliberate centralized economy for transforming the social structure and utilizing the national resource in order to fulfill certain preconceived goals. Planning is such a technique for socio-economic development as an adjustable means to the changing pattern of socio-technical environment of the society.

The economists and other social scientists as well as researchers perceived the process of planning in different ways so they suggest a set of prerequisite of successful planning, like existence of central planning authority, strong and efficient

government, honest and sound administration, fixation of objectives and targets, adequate statistical data, well formulated and integrated plan, socialistic economic organization, mobilization of financial resources, flexibility in planning, public cooperation, economic control, maintenance of proper balance, proper development policy, economy in administration, proper education and the theory of consumption.[14]

'Planning is primarily a way of thinking about social and economic problems, planning is oriented predominantly toward the future, is deeply concerned with the relation of goals to collective decisions and strives for comprehensiveness in policy and programme wherever these modes of thought are applied, there is a presumption that planning is being done.'[15]

'Planning is a continuous movement towards desired goals and, because of this all major decisions has to be made by agencies informed of those goals and the social purpose behind them. Even in considering a five-year period, forward and long-term planning has always to be kept in view. Indeed, perspective planning is the essence of the planning process. As this process develops, there is a certain rhythm of expansion in the development of the people, and a sense of enterprise and achievement comes to them. They are conscious of a purpose in life and have a feeling of being participants in the making of history.'[16]

Planning may be identified as the future-oriented problem-solving process. Major features of general planning include a sequence of actions which are designed to solve problems which possibly may arrive in the future. 'The planning problems vary but tend to be primarily economic and social; the planning period, the time horizon of 'the future', also varies according to the type and level of planning; but all planning involves a sequential process which can be conceptualized into a number of stages, such as:

- the identification of the problem;
- the formulation of general goals and more specific and measurable objectives relating to the problem;
- the identification of possible constraints;
- the projection of the future situation;

- the generation and evaluation of alternative courses of action; and the production of a preferred plan which in its generic form may include any policy statement or strategy as well as a definitive plan.'[17]

Within the general planning framework, there are various types of planning.

i) Physical and Economic Planning

The physical planning is mainly concerned with the Planning of area's physical structure- land use, communications, utilities and so on, and has its origin in the regulation and control of town development. Economic Planning is concerned more with the economic structure of an area and its overall level of prosperity.[18]

ii) Allocative and Innovative Planning

Allocative planning is concerned with co-ordination, the resolution of conflicts ensuring that, the existing system is ticking over efficiently through time in accordance with evolving policies. It is also known as regulatory planning.[19]

Innovative planning, on the other hand is more concerned with improving/developing the system as a whole, introducing new aims and objectives attempting to change on a large scale. For this reason it is sometimes known as development planning.

iii) Single level and Multi-level Planning

'Planning processes can also be differentiated on the basis of the territorial levels of which planning are done. In many countries, specially of the underdeveloped world, plan formulation is done at the national level alone. Lower territorial levels involve themselves in the planning process, only at the implementation stage. This is partly because of the absence or inadequacy of technical know-how and leadership at lower levels and partly because of the lack of an institutional framework developed for the purpose.'[20] Such type of planning is referred to the single level planning.

On the other hand, planning can be attempted at several territorial levels. This may be called multi level planning. How many levels of planning will there be, is determined by variety of factors, such as the size of the country, its administrative pattern, physical geography and regional structure.

iv) Indicative and Imperative Planning

Indicative planning merely lays down general guidelines and is advisory in nature, imperative or command planning involves specific directives.

v) Short-term and Long-term Planning

'From the temporal point of view planning can be short term and long term. Short-term planning is designed to solve certain pressing problems which do not require large-scale changes in the social and economic order. It may be used to increase production and employment opportunities; to adjust production to market demand and supply, and to meet the targets set by long term plans. Long-term planning some times erroneously called perspective planning, aims at the institutional and structural changes necessary for achieving the long-term social and economic goals of the society.'[21]

vi) Sectoral and Spatial Planning

Sectoral planning is designed essentially for special purpose, like, to develop the various sectors of the economy such as agriculture, industry, transportation, power, etc., either individually or simultaneously.

'The order in the process of development is not however confined to functional sub-systems; it is equally profound in the spatial incidence and spread of economic development and manifests itself in the formation of spatial sub-systems or regions'.[22] Spatial planning processes is different from sectoral planning process. Whereas in the latter, development as evident in space is the consequences of sectoral plans, in the former, sectoral developments emanate from an integrated spatial plan.

1.3 CONCEPT OF DEVELOPMENT

'Development' is a relative concept and there is neither any clear and agreed definition nor a single measure acceptable to all. The idea of development has been interpreted differently by different scholars depending upon the context in which the term is being used. When we use the word 'development' in the study, it implies an improvement in the material well-being of its people. Material well-being of a region can be identified with the increase in the real production, availability of amenities and services, infrastructure facilities, better conditions of living, increased employment

opportunities and so on. Any change for betterment in these parameters indicates development.[23]

'The concept of *development* as applied to a society is a complex one. Development is not the same as societal change. The latter includes changes in society which may be detrimental as well as beneficial, whereas development tends to be equated with beneficial side only, with progress or improvement - for example, improvement in living standards, the adoption of new technologies, the establishment of new institutions.'[24] The concept of development varies from person to person, place to place and time to time as development for one person may not be for other person. It is a multi-dimensional process involving the reorganization and reorientation of the entire economic and social system. Development involves the implicit and explicit value judgment about the direction and speed of change. In the planning for development the notion of development has the common and ultimate goal of enhancing the levels of living and the general condition of human welfare.

The conceptual basis of development does not lie only in quantitative growth but it is also related to qualitative assessment. While taking its quantitative aspect, it concludes with a basic objective of development, i.e., welfare of society. In order to assess the landscape of economic development, one should also observe the economic and social welfare rather than production and distribution. However, the concept of welfare involves value judgment regarding various aspects, but it still can not be neglected altogether. Thus it is obvious that development means an upward movement not merely of national but also of the entire social system.

The concept of development as applied to the society is a very complex one. Although it includes economic growth as an essential aspect as it carries forward the society according to the prevailing value judgment. Till 1960s the term 'economic development' was often used as a synonym of economic growth in economic literature. Now economic development is no longer considered identical with economic growth. It is taken to mean growth plus progressive changes in certain crucial variables which determine the well-being of the people. Mahbub-ul Haq, a leading Pakistani economist remarked, 'the problem of development must be defined

as a selective attack on the worst forms of poverty. Development goals must be defined in terms of progressive reduction and eventual elimination of malnutrition, disease, illiteracy, squalor, unemployment, and inequalities. We were taught to take care of our GNP because it would take care of poverty. Let us reverse this and take care of poverty because it will take care of the GNP. In other words, let us worry about the content of GNP even more than its rates of increase.'[25] Thus economic development is regarded as a process whereby the real per capita income increases along with the reduction in inequalities of income and satisfaction of the preferences of the masses as a whole.

While in, simply, the economic development is growth of economy reflected in the increase of per capita income and consequent purchasing power, higher economic output etc., on the other hand, the social development may be defined as the change of social structure reflected in the raising of living standard of people, literacy rate, ideal age and sex ratio. Both these concepts deals with society as a whole and it may include and increase the growth of output and national income, reducing of disparities in the distribution of national income and regional level of living, prediction in unemployment and provision of employment opportunity etc. All these processes are complexly interrelated and interdependent to each other.

1.4 CONCEPT OF REGIONAL DEVELOPMENT

Regional development may be defined as the process of development in a particular region. In other words, the development within the framework of spatial organization of the society is perceived as regional development. Regional development is ultimately the result of the location of economic activities in response to differential regional attractions. Shifts in the location pattern have direct repercussions on income, employment and welfare. Since spatial organisation is a function of activity and interaction patterns, regional development is simply an expression of these patterns.

'Regional development is often used in a relative context, comparing problem regions with the prosperous regions, or with the national context, on the basis of a variety of socio-economic indicators'.[26] In a rural economy the development, infact,

refers to a transformation of the institutional structure of the society. Since, the human society consists of multi-dimensional traits, the regional development has different connotation, because it is dealt with multi-disciplinary considerations.[27]

The regional concept provides answers to the assurance and persistence of spatial variation of development. The definition of disparities in development as implied in the regional concept can be stated as the areas or region whose economy is organized around places outside their boundaries tend to be less developed.[28]

Regional diversity and disparity affects the process of regional development. Regional disparity indicates the inequality in the levels of exploitation of development potential among different regions, taking the factors other than natural. India, with its sub-continental size, and the chronological depth of its tradition, presents a spatial variations of development which enables scholars to abstract generalization of significance in terms of inter-regional diversities as well as disparities with a view to utilize them for the analysis of problems and to the formulation of policies relating to regional development.[29] The aim of regional development is to improve the level of well being of the people of area.[30]

1.5 REGIONAL PLANNING IN INDIA

In the initial stage, in 1930's the regional planning was generally under stood to mean natural resource planning, and thus its role was confined to determine the ways and means of developing the natural resources of a region. However, with the passage of time, the emphasis on natural resource planning was reduced considerably as new dimensions of urban and metropolitan planning, environmental planning, human resource and community planning, planning for problem areas, etc., considerably enlarged the scope and content of regional planning.

Since 1951, the year when the first five year plan was launched, Indian Planning is normative single–level with greater emphasis on the sectoral approach. Sectoral plans, integrated into a single whole and fitted into the framework of national goals and objectives, have been prepared and implemented. Indian planning is also marked by centralized at the national level. Until very recently, no serious attempt was made to prepare plans at lower territorial levels such as the state, district,

development block or region with the same competence and seriousness as at the national level.[31] Sectoral macro-level approach failed to attain the target achievements of five year plans. Consequently, the planning process got decentralized to state level Planning and now emphasis is laid on planning for regional development.[32]

EMPHASIS OF PLANNING FOR SOCIO-ECONOMIC DEVELOPMENT DURING SUCCESSIVE PLANS

The concept of Planning in India was much known not only after the independence in 1947, rather even before the independence. In 1938, M. Visvewaraya prepared a Ten Year Plan for industrialization of the country with an objective to double the national income in ten year period. In 1938, a committee chaired by Jawahar Lal Nehru was set up by Congress for the purpose known as National Planning Committee. In 1946, an Advisory Plan Board was appointed to make policy and formulation of the National Planning Commission.

After independence, the government of India set up the Planning Commission in 1950 under the chairmanship of Prime Minister J.L. Nehru, to assess the country's needs of materials, capital and human resources to formulate a Plan for their more balanced and effective utilization. The extra constitutional and non-statutory body was set up a resolution of the union cabinet by J.L. Nehru himself to formulate an integrated Five Year Plan and to act as an advisory body to the union govt. Since 1951, different national plans are as follows;

First Five Year Plan (1951-56)

During this plan period, due to the partition of India, problems were (i) influx of refugees, (ii) severe food shortage, (iii) mounting inflation, (iv) disequilibrium in the economy caused by the Second World War. In such situation this plan laid the emphasis on - (i) rehabilitation of refugees, (ii) rapid agricultural development to achieve food self sufficiency, (iii) control inflation, (iv) initiation of a process of all round balanced development which would ensure a rising national income and steady improvement in the living standards over a period of time.

It was highly centralized operation due to following factors:

- The country had little experience in planning and it was imposed from the top.

- One party was in power both at the centre and in the states. The party's policies at the centre were largely carried out by the states with little conflict.
- The state had little experience in plan formulation and project proposal.
- The Central government was supplying bulk of the finance required for plan implementation in the state either in the form of grants or loans.[33]

Second Five Year Plan (1956-61)

It was based on socialistic pattern of society. The target of the plan was to raise national income and per capita income by 25 percent and 11 percent respectively. In the context of regional planning two surveys were conducted, namely Pilot Regional Survey of the Mysore state during 1956-58 and a Diagnostic Survey of Damodar Valley Region in 1957, for making an appraisal of existing resources and suggesting strategies for regional development.

During this time 'Intensive Area Development Programme (IADP) was launched in 1960 in seven selected districts of seven states. In 1956, Elwin Committee recommended the approach for tribal areas. Consequently in 1957, 'Tribal Development Block' (TDB) approach was adopted.

Due to wide regional disparities in India, the planners emphasized on the balanced regional development ever since the initiation of the planning process in India and perceived that, the pattern of investment must be devised as to lead to balanced regional development.[34]

Third Five Year Plan (1961-66)

Third Five Year Plan set the goal of raising the national income by 30 percent during five years making expansion of basic industries and development opportunities. Because of the wide regional disparities, some serious concerns to the problem of balanced regional development were taken for the first time.[35]

Annual Plan (1966-69)

It is referred to as the 'Plan Holiday' was adopted by the Planning Commission due to odd circumstances like, India-China War (1962) and India-Pakistan conflict (1965) accompanied by two successive droughts in 1965 and 1966,

and devaluation of Rupee for three years, and consequently the Fourth Five Year Plan should start in 1969.

Fourth Five Year Plan (1969-74)

This Plan laid emphasis on to accentuate the process of industrial dispersal and stimulated the economy of the less developed area through regional and local planning process. In this plan, introduced a number of other schemes for the benefits of the rural poor such as:

- Small Farmer's Development Agency (SFDA)
- Marignal Farmer's and Agricultural Labourer's Development Agency (MFAL)
- Drought Prone Area Programme (DPAP).
- Crash Scheme for Rural Employment (CSRE)
- Pilot Intensive Rural Employment Projects (PIREP).
- Integrated Tribal Development Programme (ITDP) since large number of rural poor live in relatively less developed regions, all these programmes were expected to benefit the less developed regions more in comparison with the developed regions. Some programmes were concerned with identification of backward regions for purposes of granting concessions and financial assistance to industries established in such areas and weightage to backward states in the allocation of central assistance.[36]

In this plan period the Multi-level Planning was started stressing up on the formulation of plans at district and lower level to provide adequate infrastructure facilities. Simply, the planning for socio-economic development at several territorial levels, instead of at a single national level is known as multi-level planning. In a multi-level Planning system, lower-level regional plans form the basis for higher-level regional plans and the higher–level regional plans provide the framework for lower-level regional plans. The higher-level regional plans offer a common framework for the plans at the next level in a system of second-level regions, and the lower-level regional plans provide the details for more generalized planning at the next higher level. In a multi-level regional planning set-up, people become direct participants in planning and development. The goals and objectives of national planning percolate down to the smallest units through the channels formed by the

hierarchy of regions. These very channels transmit the feedback which is conspicuously, absent in our present planning system.[37]

Fifth Five Year Plan (1974-79)

The Fifth Five Year Plan (1974-79) was terminated a year earlier on April 1978 to usher in an area of rolling plan scheme formulated by the government led by the Janata Party in the Centre. The strategy of the removal of regional imbalances of Fourth Plan were kept continued in the Fifth Plan also on treatment to the approach of concepts of 'growth centre' and 'Central Place' strategies.[38]

Sixth Five Year Plan (1980-85)

In this Plan greater emphasis was given on most of the above programmes. To provide an integrated approach to the problems of regional inequalities, the mechanism of area planning was adopted. The main objectives of this plan were to eliminate unemployment, raising standard of living of the people below poverty line, and providing services to the masses with a distinctively rural bias. In this plan special importance was given to follow the decentralization of district level planning into block level planning in order to eliminate the inter and intra-district socio-economic inequalities.

District plans were supposed to be followed on the line of backlog cum problem oriented concept as per guideline formed by the state planning processes were the function of (i) resource analysis, (ii) provision of communication services and (iii) formulation of spatial plans and Planning for target groups, i.e. various scheme for the welfare of labour, scheduled castes and backward classes, and programmes relating to women and children.[39]

Seventh Five Year Plan (1985-90)

The Seventh Five Year Plan correctly recognized that two critical determinants of a region's economic status were agricultural productivity, and human resource potential and reduction in inter-regional disparities would help greatly in the task of reducing regional imbalances in the country.[40] To reduce unemployment and consequently the incidence of poverty, social programmes like Jawahar Rojgar Yojana were initiated in addition to existing programmes.

Eighth Five Year Plan (1992-97)

This plan was launched immediately after the initiation of structural adjustment and macro stabilization policies which were necessitated by the worsening Balance of Payments position and inflation process during 1990-91. In this plan emphasis was given on economic growth and its allied sector to overcome deficiency of balance of payment, and also to significant growth of trade and commerce.

Ninth Five Year Plan (1997-2002)

It was launched in the 50th year of India's independence. This plan was based on a careful stock taking of the strengths and weakness of past development strategies in order to provide appropriate direction and balance for the socio-economic development of the country. Apart from basic objectives of economic development, the emphasis was also made to develop the social infrastructure like health and education sectors by launching various schemes and programmes.

Tenth Five Year Plan (2002-2007)

This was approved on October 5, 2002 by unveiling a tough six points reform agenda to push the annual growth from a stagnant 5.5 percent to 8 percent. The other highlights of the plan include the development of regions by ensuring the socio-economic development, in order to ensuring the harmony with an environment for developing an optimal spatial organisation of the society.[41]

The Damodar Valley Corporation (DVC) and the National Capital Region (NCR) are the two significant regional planning efforts of the country. Though the partial success of the DVC and distinguish poor performance of the NCR was achieved, but reveals the official apathy to the spirit of regional planning in India.

73rd and 74th amendments to the Indian constitution have a new hope for the grass root level planning in India. These amendments have given a new direction to the planning process in the country. These are aimed to collect local resources and demands of people at village level.

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CHAPTER - 2

GENERAL, PHYSICAL, CULTURAL AND DEMOGRAPHIC PROFILE OF MALDA DISTRICT

GENERAL, PHYSICAL, CULTURAL AND DEMOGRAPHIC PROFILE OF MALDA DISTRICT

Before assessing and evaluating the nature and characteristics of visual imprints made by man upon physical landscape, it is essential to have an overview of its physico-cultural and socio-economic attributes, which shape the geographical identity of a region. This is prerequisite for the analysis of spatial organisation of settlements, amenities and facilities, their spacing, hierarchy, gap and centrality scores, with the assumptions that the environment affects the nature of human habitat. The evolution, growth, organisation and areal association of all the settlements and their amenities and facilities are the out come of prevailing ecological conditions, cultural and social values of the inhabitants, technology, management systems and the settling process through time space. Keeping in view the importance of the facts some of the physico-cultural and socio-economic attributes have been discussed in sequent manner.

2.1 ADMINISTRATIVE SETTING

Malda district is located to the immediate North of the Ganga river, at a distance of about 347 km. from Kolkata (capital of state of West Bengal). Geographically it lies in between 24°40'20" to 25°32'08" North latitudes and 87°45'50" to 88°28'10" East longitudes[1] (Fig. 2.1).The district consists of two sub-divisions, i.e., Sadar and Chanchal, and English Bazar is its headquarter as well as head of Sadar sub-division.[2] The district comprises 15 Community Development Blocks i.e., Harishchandrapur-I, Harishchandrapur-II, Chanchal-I, Chanchal-II, Ratua-I, Ratua-II, Gazole, Manikchak, Habibpur, Bamangola, Old Malda, English Bazar, Kaliachak-I, Kaliachak-II and Kaliachak-III.

The district covers an area of 3733.0* sq. km., wherein rural area covers 3,707.63 sq. km. and urban area covers 25.37 sq. km..[3] Gram Panchayats and Gram Sansads in the district are accounted for 147 and 2017 respectively.[4] It has 1,801 *mouzas* (settlements) of which 160 are uninhabited and 1,641 are inhabited

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* 3733.0 sq. km. is the total geographical area of the district, but according to the District Statistical Hand Book, Malda, 2001, (p. 09) when the area under different C.D. blocks and Municipalities (Two) are added together the total area in the district stands at 3583.03 sq.km. In the present study, the analysis in term of area at block level the mentioned area value i.e., 3583.03 sq. km. in respective statistical handbook has been considered. The area of 3733.0 sq. km. has not been considered in the present work.

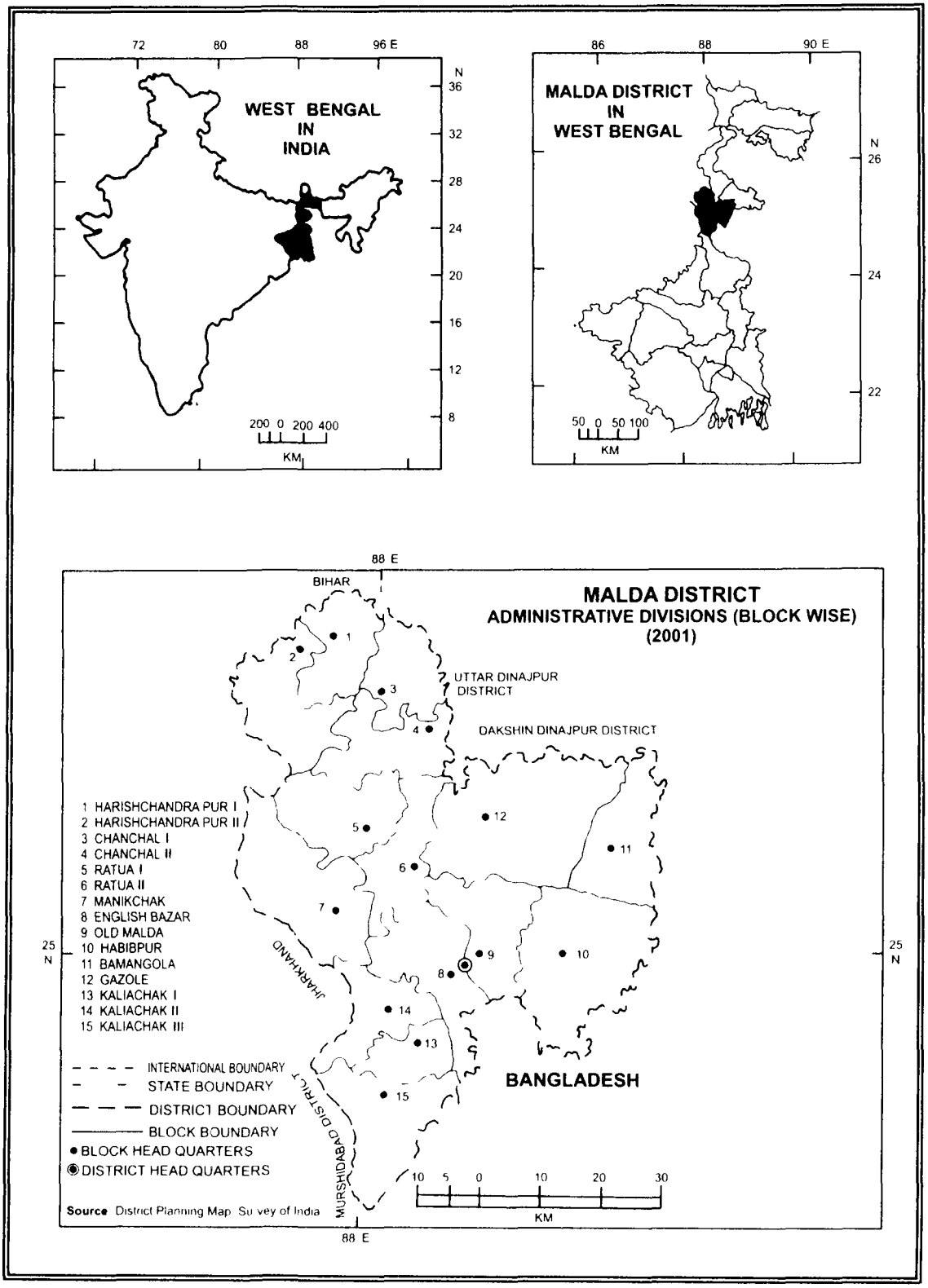

WEST BENGAL
IN
INDIA
72
80
88
96 E
N
36
32
28
24
20
16
12
8
200 0 200 400
KM
MALDA DISTRICT
IN
WEST BENGAL
86
88
90 E
N
26
24
22
50 0 50 100
KM
MALDA DISTRICT
ADMINISTRATIVE DIVISIONS (BLOCK WISE)
(2001)
88 E
BIHAR
UTTAR DINAJPUR
DISTRICT
DAKSHIN DINAJPUR DISTRICT
1 HARISHCHANDRA PUR I
2 HARISHCHANDRA PUR II
3 CHANCHAL I
4 CHANCHAL II
5 RATUA I
6 RATUA II
7 MANIKCHAK
8 ENGLISH BAZAR
9 OLD MALDA
10 HABIBPUR
11 BAMANGOLA
12 GAZOLE
13 KALIACHAK I
14 KALIACHAK II
15 KALIACHAK III
25
N
JHARKHAND
BANGLADESH
INTERNATIONAL BOUNDARY
STATE BOUNDARY
DISTRICT BOUNDARY
BLOCK BOUNDARY
BLOCK HEAD QUARTERS
DISTRICT HEAD QUARTERS
MURSHIDABAD DISTRICT
10 5 0 10 20 30
KM
Source District Planning Map Survey of India
88 E

Fig. 2.1

(rural settlements).[5] The district has two municipal cities namely English Bazar and Old Malda, and three non Municipal census towns i.e., Kachupukur, Kendua and Aiho.[6] The study area inhabits total population of 3,290,468 persons, of which 1,689,406 (51.34%) were males and 1,601,062 (48.66%) were females. Further it accounts 3,049,528 (92.68%) rural and 240,940 (7.32%) persons urban.[7]

2.2 PHYSICAL SETTING

The district is characterized by low-lying alluvial plains, sloping towards the south. North-eastern part of the district contains few elevated tracts which are intersected by deep water channels thereby giving the appearance of small hills.[8]

PHYSIOGRAPHIC DIVISIONS

Physiographically Malda district consists of a vast alluvial plain. The river Mahananda flowing from north to south-east direction, divide the district into eastern and western regions. Further the Kalindri river divide the western part into northern and southern regions. The eastern part is comparatively high and undulating, while western part is low and fertile. On the basis of topography and nature of soil, the district may be divided into three distinct natural regions, i.e., Barind, Diara and Tal (Fig. 2.2).

Barind

The Barind region is comparatively having higher elevation, lies on the eastern margin of the Mahananda river. The highest elevation of the district measuring 39 meters from the mean sea level is recorded in Gazole block which is under this division. The region is stretched over a wide area in the district up to Rajshahi, Dinajpur and Bogra in Bangladesh. Its topography is wide undulation with successive ridges and depressions scanned with small water courses in the valleys. The ground is baked hard as iron. Drinking water becomes scarce during hot weather. It is characterised by old alluvial and relatively infertile soil. Except in autumn when it become green with winter rice, it remains arid. 04 blocks of the district i.e., Old Malda, Gazole, Bamangola and Habibpur fall under this natural division. The region covers 1,348.3 sq. km. (37.63%) area of the district.[9] It comprises 47.3 percent settlements and 24.45 percent population of the study area.

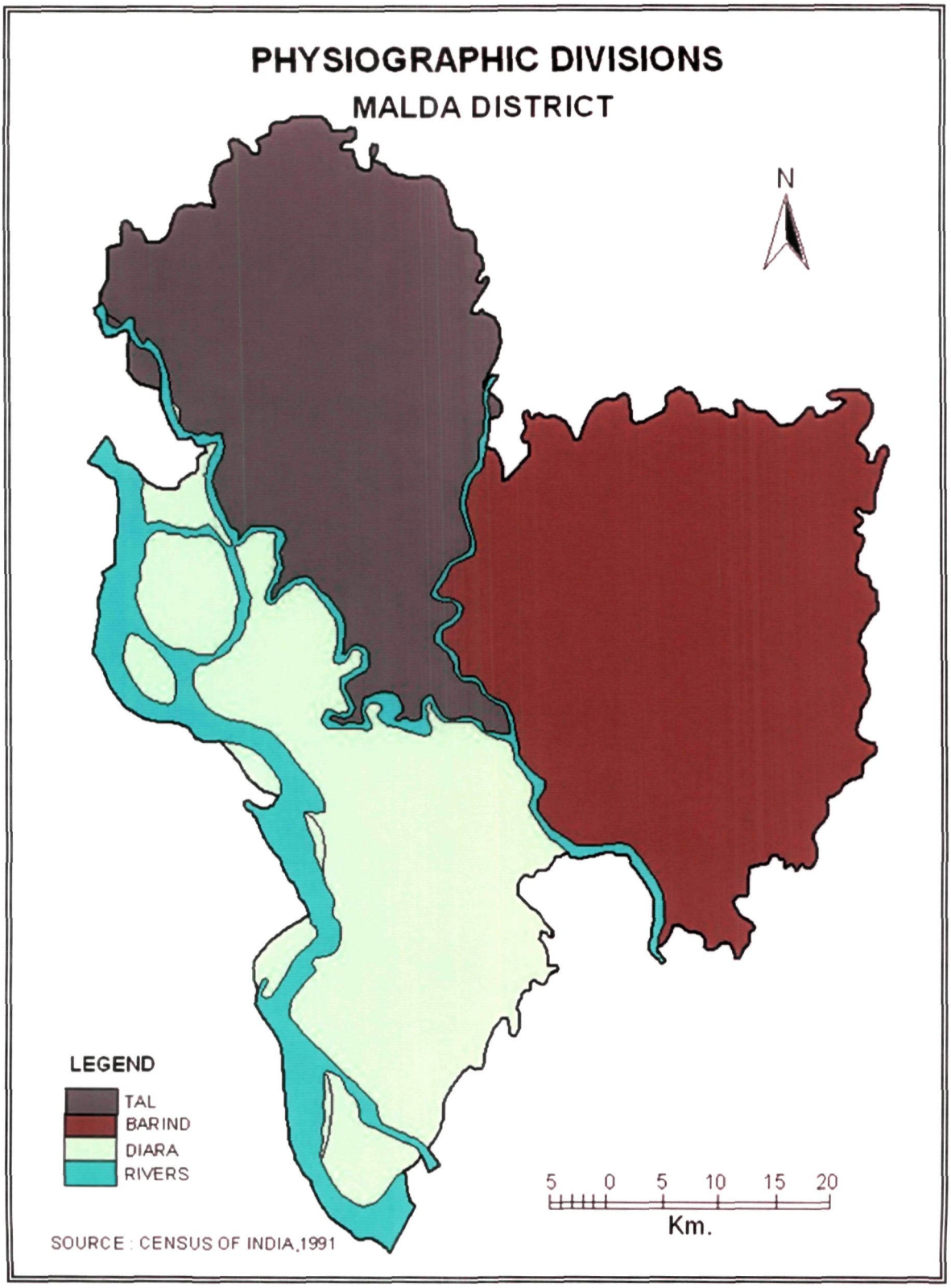

PHYSIOGRAPHIC DIVISIONS
MALDA DISTRICT
N
LEGEND
TAL
BARIND
DIARA
RIVERS
5 0 5 10 15 20
Km.
SOURCE : CENSUS OF INDIA,1991

Fig. 2.2

Diara

Diara region consists of a strip of roughly 12.80 km. in width along the western and southern sides of the district. Its formation is related to the deposition made by fluvial action of the Ganges and the old channels of Bhagirathi river for centuries of time. This region lies to the south of the river Kalindri. The soil is of light variety with sandy appearance, very fertile. Mango gardens are common and mulberry is also grown in this natural division. Five blocks i.e., English Bazar, Kaliachak-I, Kaliachak-II, Kaliachak-III and Manikchak are included in this region. It encompasses 1,152.3 sq. km. (32.16%) area, includes 22.3 percent settlement and 42.81 percent population of the district.

Tal

Tal region lies to the west of the river Mahananda and to the north of the river Kalindri. It is a low-lying area subjected to inundation with the rise of rivers the Ganges, the Mahananda and the Kalindri. The Tal region gradually slopes down towards the south-west and merges with the Diara region. The blocks comprised in this region are Ratua-I, Ratua-II, Chanchal-I, Chanchal-II, Harishchandrapur-I and Harishchandrapur-II. It accounts 1,082.4 sq. km. (30.21%) area, 30.4 percent settlements and 32.74 percent population of the study area.

DRAINAGE PATTERN

Rivers in Malda district constitute an important feature upon its landscape. The rivers follow general slope of the land and traverse the area from north, north-east and north-west to south-east are, the Ganges, the Mahananda, Fulahar, Kalindri, Tangoan, Punarbhaba, Pagla and Bhagirathi (Fig. 2.3). All the main rivers of the district are of the Himalayan or sub-Himalayan origin and flow in southerly directions.[10] These rivers are the source of floods in the district during the rainy season.

Among all the rivers, the Ganga is main with its total length 172 km. (including its tributaries), enter the district at Gaduri of Bhutni *Char* of Manikchak block and flowing over the blocks of Manikchak, Kaliachak-II and Kaliachak-III. Its main tributaries are Fulahar, Bhagirathi and Kalindri. Due to the devastating flood particularly in western side of the district, huge amount of life and property,

human establishments, and agricultural land goes into the Ganga each year. The details about the important rivers of the district are given in Table 2.1.

Table 2.1: Particulars of the main Rivers
Malda District

Particulars	Name of the rivers				
	The Ganges	The Mahananda	The Punarbhaba	The Tangon	The Kalindri
Entry point	Gaduri of Bhutnichar (Manikchak Block)	Junction of Blocks Chanchchal I, Ratua-II and Gazole	North-East of Block Bamangola	Junction of blocks Bamangola and Gazole	Mihaghat of Block Harish-chandrapur II
Runs through the blocks	Manikchak, Kaliachak-II and Kaliachak-III	Gazole, Old Malda, English Bazar and Habibpur	Bamangola	Bamangola, Habibpur, Old Malda and Gazole	Harishchandra II, Ratua-I, Manikchak and English Bazar
Length in the district	172 km. (including tributaries)	886 km. (including tributaries)	64.4 km. (including tributaries)	64.6 km. (including tributaries)	Not available
Branches	Fulahar, Bhagirathi and Kalindri	Kalindri and Pagla	Haria	Chunakali Khal	Fulahar
End pint	Par-deonapur of Block Kaliachak-III	Aiho of Block Habibpur	Eastern boarder of Block Bamangola	Mahanda	Mahananda at Bachamari of Block Old Malda

Source: Official records, Office of the Assistant Engineer, District Irrigation, Malda, 2001.

Apart from the main rivers and their tributaries, many large and small *beels* (shallow depression filled with water covering large area) and tanks are found in the district. Largest *beel* is Ahora in the Tangon river valley covering about 03 sq. km. area. Other than Ahora some *beels* are located mainly in the marshy tract lies between the Mahananda river and the main road from English Bazar to Gour. Some *beels* are also found in the Diara tract due to depressions left by the Ganges, e.g., Gadai *beel* in which there are approximately 30 thousand tanks of different sizes of which 11 thousands are irrigation tanks.

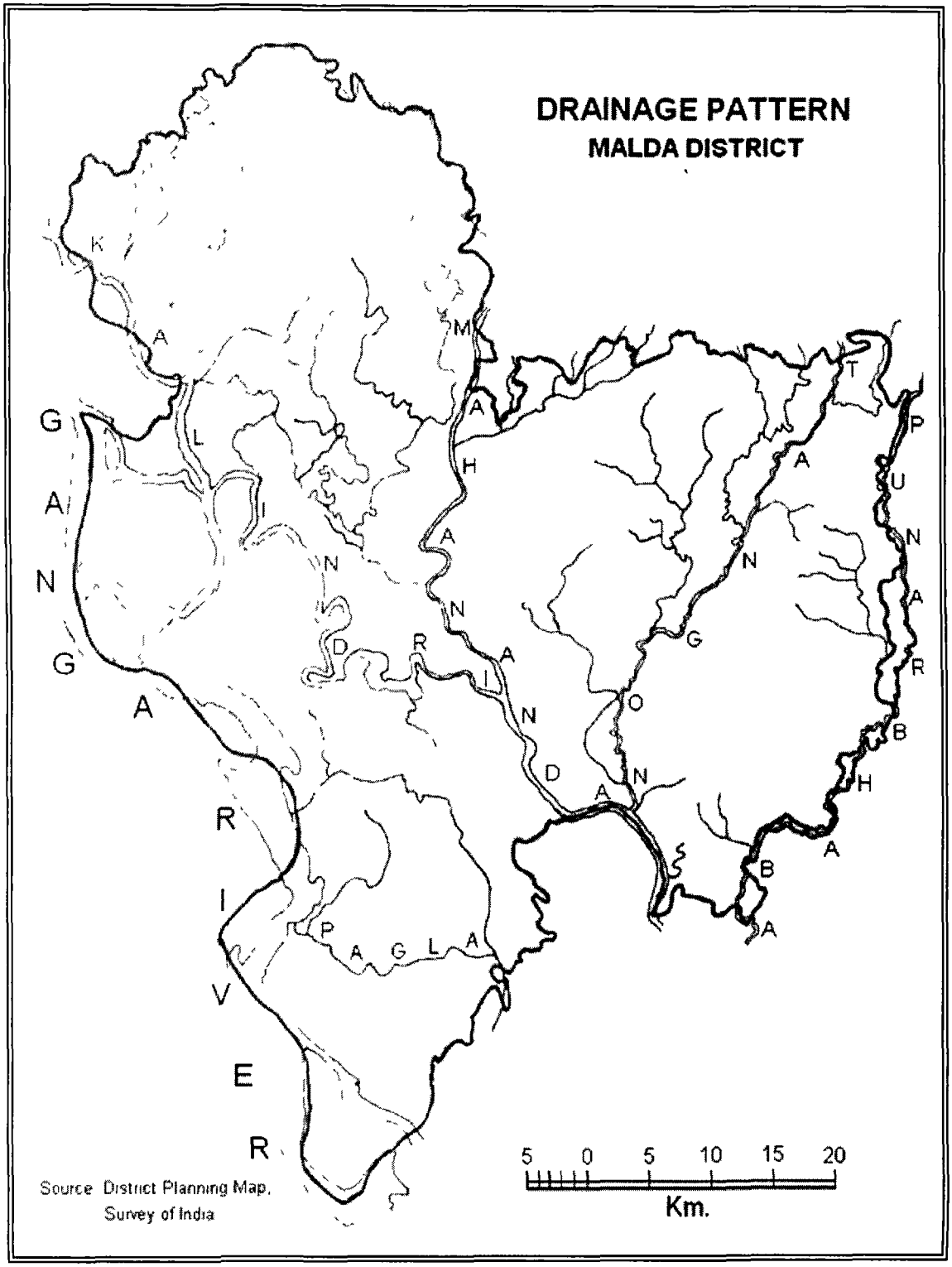

DRAINAGE PATTERN
MALDA DISTRICT
GANGA
RIVER
MAHANANDA
PUNARBHABA
KALINDRI
PAGLA
5 0 5 10 15 20
Km.
Source District Planning Map,
Survey of India

Fig. 2.3

CLIMATIC CHARACTERISTICS

The climate of the district is very hot and sultry during summer season, with plentiful rains and moisture in the air throughout the year. The proximity of the Bay of Bengal on the south of the state (West Bengal) and the alignment of the Himalaya on the north of the state determines largely the climatic character, i.e., the distribution of the weather elements in the district. Irrespective of the general vagaries and mechanism of the monsoon, seasonal distribution of the elements such as temperature, rainfall and relative humidity are too uneven.[11]

An important feature of the climatic conditions of the district is the periodic wind that blows across it. The seasonal winds are known as the monsoons. The climate of the district can be described under the four seasons recognized by the meteorological departments, government of India. The successive seasons of the district are:

(a) The summer season,

(b) The advance of the monsoon,

(c) The retreat of the monsoon, and

(d) The cold season

The Summer Season

This season roughly covers the period between March to May, the normal date of arrival of the monsoon. Temperature starts increasing from the month of March. May is the hottest month. In the district, the thunder storm that rise between April and May are locally known as *'Kal Baisakhi'*, such storm do not affect extensively and may be considered as local atmospheric disturbances. These storms bring down the temperature for a short and give relief to the people in hot summer evening.

The maximum mean monthly temperature i.e., 32°C was recorded during April in 1999, followed by 31°C during May. During this season rainfall occurred in little amount viz. 13 cm. and 130 cm. during April and May respectively. March well comes the summer season recorded mean monthly temperature 27°C in 1999 but no rainfall was occurred.

The Advance of the Monsoon

The natural causes that guide monsoon winds, present a complex study. By the 15th June, the district is under the influence of monsoon winds. The

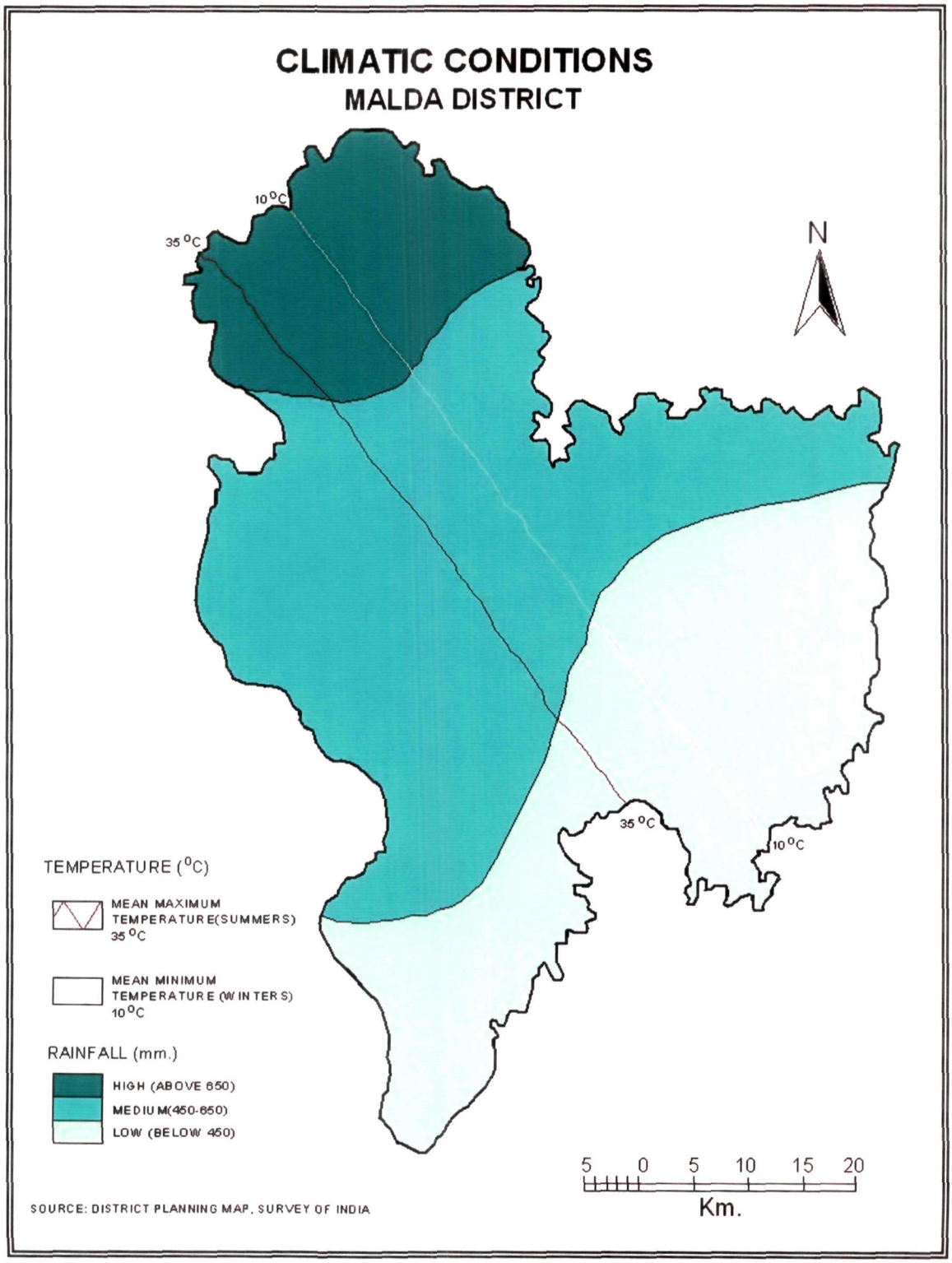

CLIMATIC CONDITIONS
MALDA DISTRICT
10 °C
35 °C
N
35 °C
10 °C
TEMPERATURE (°C)
MEAN MAXIMUM TEMPERATURE(SUMMERS) 35 °C
MEAN MINIMUM TEMPERATURE (WINTERS) 10 °C
RAINFALL (mm.)
HIGH (ABOVE 650)
MEDIUM(450-650)
LOW (BELOW 450)
5 0 5 10 15 20
Km.
SOURCE: DISTRICT PLANNING MAP, SURVEY OF INDIA

Fig. 2.4

summer monsoon that carries moisture from the Bay of Bengal brings rainfall. Heavy rain starts all over the district from the advancing roll of dark clouds with a little thunder. The bursting of the monsoon is joyous phenomena for the farmers in the district as their crops depend on the mercy of rainfall which causes their food and prosperity. The intensity of rainfall increases in each next month to be recorded highest 631 cm. during September (last month of the season).

Table 2.2: Mean Monthly Rainfall and Temperature
Malda District
(1999)

Months	Monthly Rainfall (cm)	Mean Monthly Temperature (°C)
January	0	19
February	0	22
March	0	27
April	13	32
May	130	31
June	332	30
July	432	29.5
August	442	29
September	631	29
October	157	28.5
November	04	24.5
December	0	20.5

Source: District Statistical Hand Book, Malda, 2001.

The Autumn Season or Season of Retreating Monsoon

Overhead position of the sun shifts to the Southern Hemisphere, after the month of September and the intensity of the low pressure over the north-western part of India decreases. As a result the south-west monsoon winds start moving back towards south. This is called the retreating of the monsoon winds.

The Cold Season

From the last week of November to the end of February the district is under the influence of retreating of monsoon. This wind is offshore and has no moisture. As a result there is no rainfall in the winter months. The weather remains cool and sunny during January, temperature ranging between 29°C and 09°C, with mean monthly temperature 19°C. Occasional cold spells occurred accompanied with the western disturbances. Morning fog appears during the last week of

December and first week of January. This is the most pleasant season in the district.

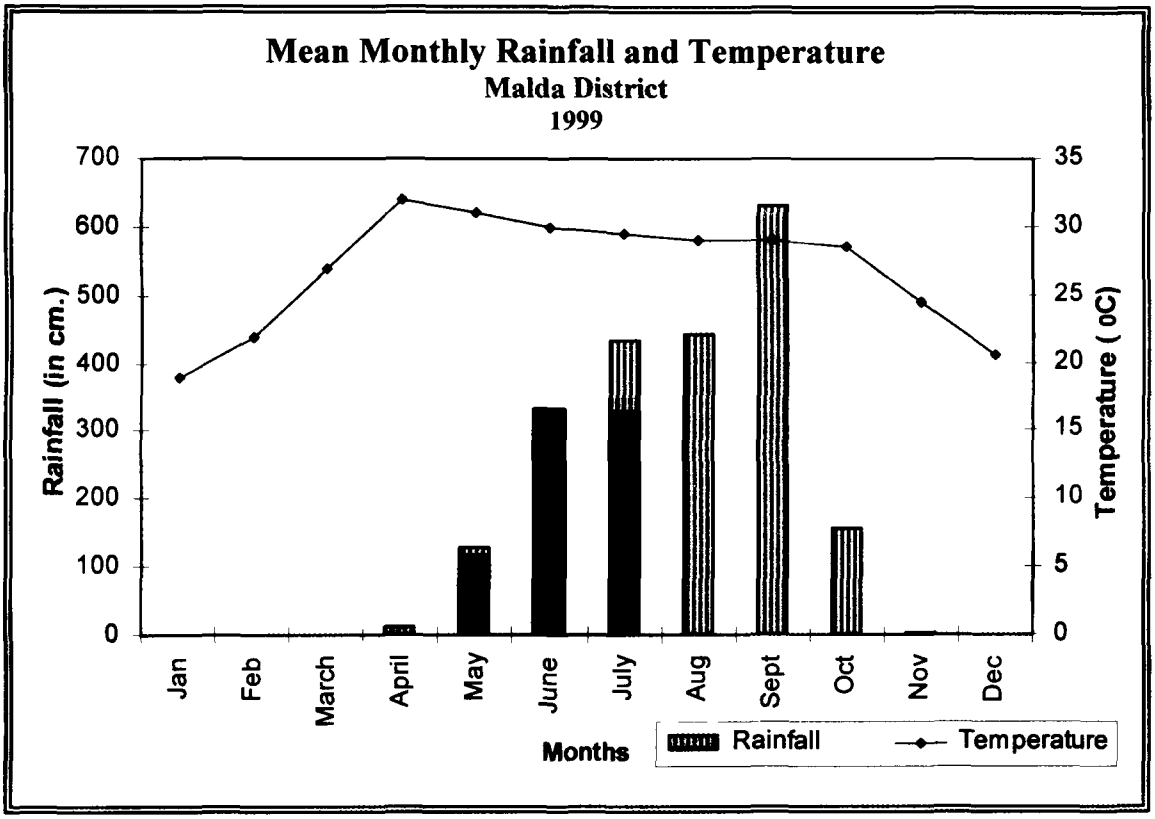


Fig. 2.5

VEGETATIONS

The district is having merely a small portion covered by vegetation, and alteration of *beels* and village shrubberies with the drier jungle of Barind region, where the ground is not occupied by the usual crops is covered by abundant natural vegetation excepting the sandy beds of rivers.[12] Old river beds, ponds, marshy land etc. have a copious vegetation of vallisneria and other plants. The areas which are subjected to frequent inundation usually covering with seedy grasses, and in marshy parts with Rosainvolucrata are plentiful. Some portions of Barind area are covered by jungles, which consist chiefly of thorny scrub bush jungles mixed with *Pipal, Bat, Simul* and *Pakur* trees and Nepal Bamboos. Species of thorny bamboos are also seen in Pandua. In the embarkment areas of Gour thickest or shrubberies, ordinary Neem, Jack-fruit trees, Tamarind, Bamboo, and Mango trees are seen in plenty. The soil of the western region of the district is

particularly suited for the growth of mulberry and mango. For the production of mulberry and mango Malda district is well known.

SOILS

Soil is one of the most precious gifts of nature that determines agricultural productivity. Soils are economically important as different types of soils of varying nature produced different varieties and amounts of crops leading to economic disparities.

The district lies on the western part of the alluvium filed gap between the Rajmahal hills on the west and the Garo hills on the east. The entire area is covered by alluvium that however, is of two different ages displaying different physical and physiographic characteristics.[13]

East of the Mahananda river is older (Pleistocene) alluvium forming 'Barind'. The soil of this tract is red in colour implying old alluvium formation (Fig.2.6). It is composed of still clay containing iron. It becomes extremely hard in the cold weather. The soil in this tract is mostly acidic. This tract is mainly mono cropped. The main crop grown in this region is winter rice. On the northern part of this area, jute and autumn rice in the *kharif* season and wheat in the *rabi* season are grown on a very limited scale. Extensive cultivation of summer rice is restricted only in the *Doba* area (low lying area subject to water stagnation). The soil pH of this tract varies from 4.2 to 5.5.[14]

West of the river Mahananda, the soil is light loam called do-ash. It is recently formed alluvial and consists of an admixture of clay and sand. On the eastern side, the proportion of clay is greater, but further west towards the Ganges the proportion of sand becomes greater. The do-ash type of soil is the most fertile in the district and neutral in reaction. A dark loam soil is found in the low lying areas i.e., *beels* and valleys. It has a greater admixture of clay, is fertile suitable for chilly, *aman* or *boro* paddy production. This tract of highly fertile soil formed the 'Diara' region with diversified cropping. Crops like *aus* paddy, jute, maize, wheat, pulses, oil seeds, barley and sugarcane are grown here. It is mainly mulberry and mango growing tract of the district. The pH of this tract varies from 6.8 to 7.8.

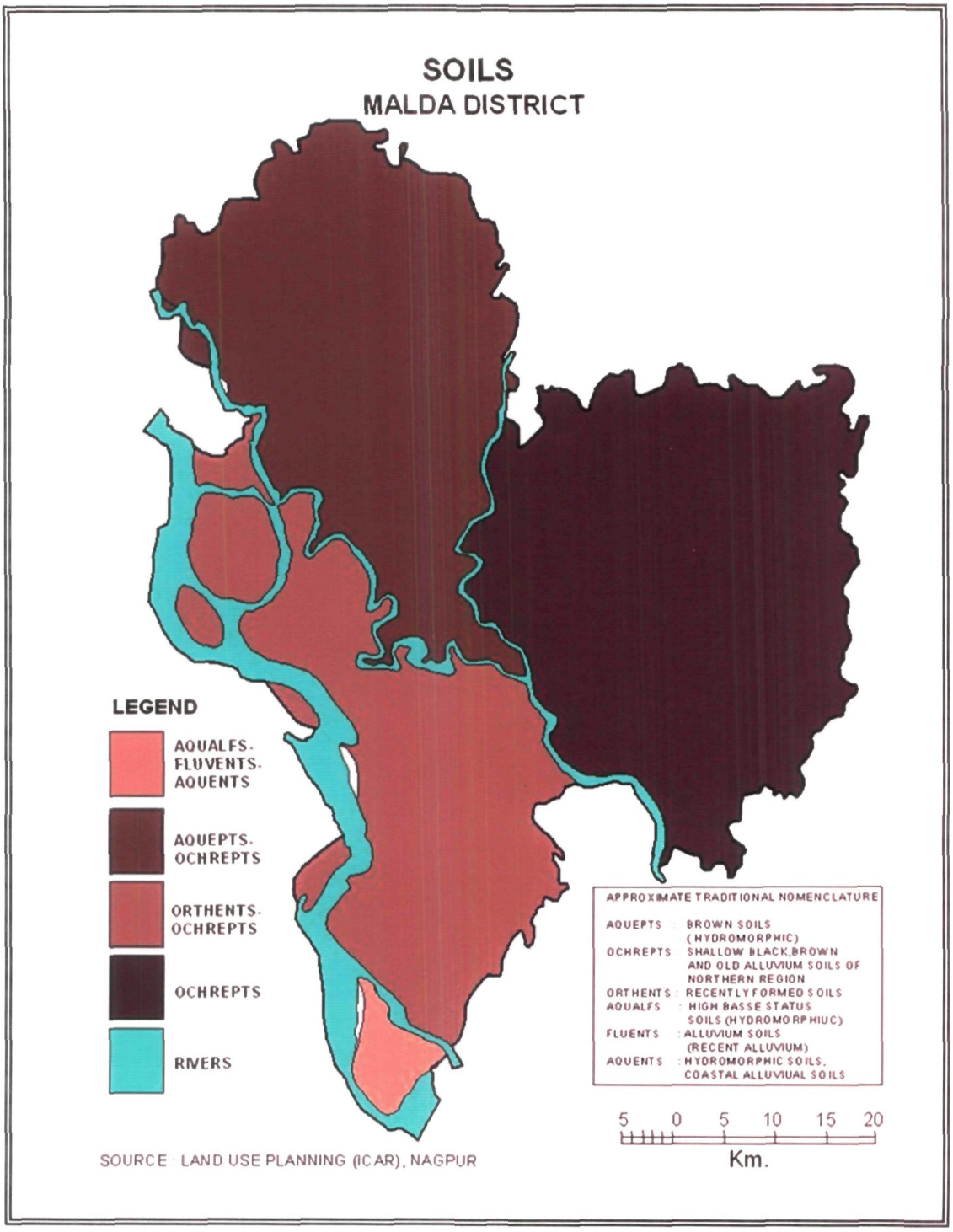

SOILS
MALDA DISTRICT
LEGEND
AQUALFS.
FLUVENTS.
AQUENTS
AQUEPTS.
OCHREPTS
ORTHENTS.
OCHREPTS
OCHREPTS
RIVERS
APPROXIMATE TRADITIONAL NOMENCLATURE
AQUEPTS : BROWN SOILS (HYDROMORPHIC)
OCHREPTS : SHALLOW BLACK,BROWN AND OLD ALLUVIUM SOILS OF NORTHERN REGION
ORTHENTS : RECENTLY FORMED SOILS
AQUALFS : HIGH BASSE STATUS SOILS (HYDROMORPHIUC)
FLUENTS : ALLUVIUM SOILS (RECENT ALLUVIUM)
AQUENTS : HYDROMORPHIC SOILS, COASTAL ALLUVIUAL SOILS
5 0 5 10 15 20
Km.
SOURCE : LAND USE PLANNING (ICAR), NAGPUR

Fig. 2.6

The soil of 'Tal' region is old alluvium with shallow black colour. The pH of the Tal tract ranges from 6.5 to 8.0. In the tract, jute, maize, *aus* and *aman* paddy are the main crops grown in *Kharif* season. In *Rabi* season wheat and *boro* paddy are also grown on a considerable area.

Another kind of brown soil is found to the extreme south of the district covering small area. This alluvial soil is very recently formed on the east coast of the Ganga river (Fig. 2.6).

2.3 CULTURAL SETTING

Habitat and culture are closely inter-related phenomena. A culture is built with the materials of the habitat and the habitat in turn is profoundly influenced by the cultural traits of its inhabitants. Culture of a region is associated with man-environment relationship.

LAND USE PATTERN

Land use pattern reflects the structure of resource base of an area. A comparison of land use and occupational pattern can give an idea of the extent of the resources of the area are being put to productive uses.

Table 2.3: Land Use Pattern
Malda District
(2000-01)

Land use Category	Area in Hectares ('000)	Percentage (%)
Total geographical area	358.3	-
Area under forest	01.68	0.47
Cultivable waste land	0.67	0.19
Current fallow land	53.46	14.91
Net cropped area (NCA)	220.91	61.65
Gross cropped area (GCA)	386.2	173.25 (to NCA)
Net irrigated area	112.90	50.65 (to NCA)
Culturable waste(including gaucher and groves) land	11.32	03.06
Home stead land	12.60	3.53
Residual Area	11.76	3.28
Area of vested land	45.92	12.82

Source: Computed from District Statistical Hand Book, Malda, 2001, and Primary Census Hand Book, 2001.

Table 2.3 and Figure 2.7 exhibits that 61.65 percent of the total geographical area of the district is under cultivation (Net Cropped Area), while 0.19 percent area is cultivable wasteland, 14.91 percent area is fallow land. Only 50.65 percent of the net cropped area (NCA) has been registered under irrigation,

while rest depends on the mercy of nature. In the district, the cropping intensity (GCA/NCAx100) has been accounted at 173.25 percent, however 3.28 percent of total geographical area is used for residential purposes, 3.52 percent home stead land and 12.82 percent is vested land.

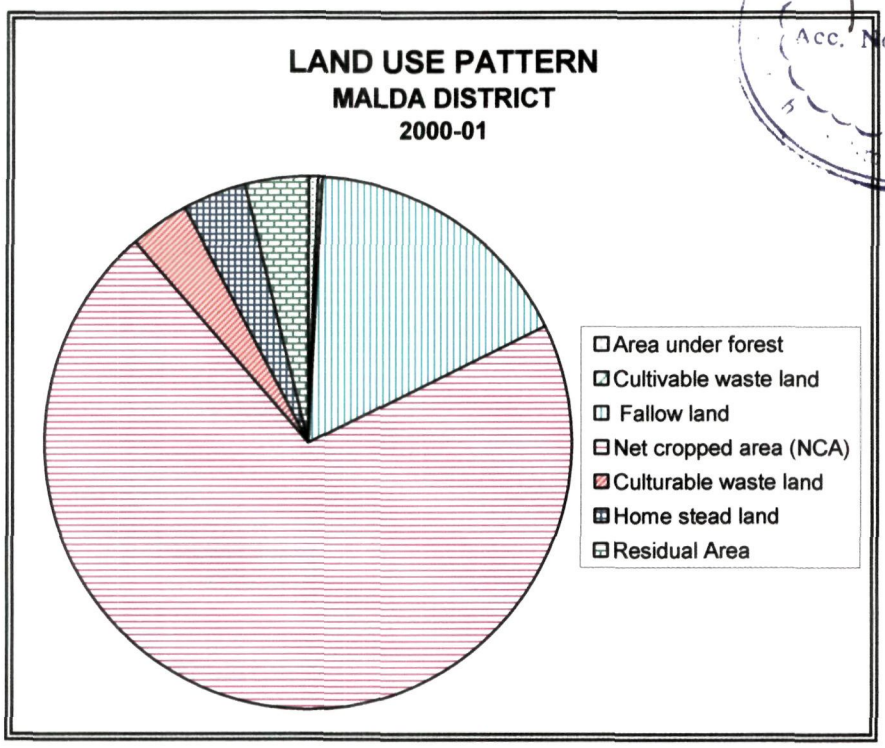


Fig. 2.7

IRRIGATION SYSTEM

Irrigation refers to the artificial supply of water by different means to the plants. In Malda district major means of irrigation are tank, river lifting, deep tube well and shallow tube well. A variation in the irrigation system at the block level is observed in the Table 2.4. Tank irrigation is under practice only in five blocks (i.e. Chanchal-I, Gazole, Bamangola, Habibpur and Old Malda). Deep tube well irrigation is completely absent in the Bamangola block. Only 0.82 percent and 0.93 percent to total irrigated area is under the deep tube well irrigation system in Habibpur and Harishchandrapur-II blocks respectively, while highest area i.e., 15.57 percent has been recorded in English Bazar block followed by Kaliachak-II block (13.24 percent). Three blocks of the study area i.e., Kaliachak-III, Harishchandrapur-II and Harishchandrapur-I are highly dependent on shallow tube

well accounting 90.54 percent, 88.89 percent and 80.13 percent of irrigated area under it. Again it is revealed from the present analysis that, highest percentage of area under irrigation to the net cropped area (irrigation intensity) has been recorded in Chanchal-I block i.e., 71.19 percent, followed by Harishchandrapur-I (67.88 percent) and Harishchandrapur-II (66.51 percent) blocks, whereas only 24.17 percent in Kaliachak-II block followed by Manikchak block (26.25 percent).

Table 2.4: Area under different sources of Irrigation
Malda District
(2000-01)

Block	% of area under different means of irrigation to total irrigated area					
	Tank	River Lift Irrigation	Deep Tube well	Shallow Tube well	Other	Irrigated area to Net cropped area (%)
Harish chandrapur-I	-	1.48	3.12	80.13	15.27	67.88
Harish-chandrapur-II	-	3.87	0.93	88.89	06.31	66.51
Chanchal-I	0.28	1.92	5.34	72.68	19.78	71.19
Chanchal-II	-	3.80	6.87	60.11	29.22	47.46
Ratua-I	-	10.30	6.12	73.40	10.18	52.53
Ratua-II	-	15.17	11.69	40.15	32.99	64.26
Gazole	3.91	8.93	3.63	52.43	31.10	27.56
Bamangola	4.04	7.73	-	73.63	14.60	35.25
Habibpur	3.57	7.59	0.82	30.86	57.16	28.75
Old Malda	4.50	19.50	13.13	35.34	27.53	30.98
English Bazar	-	8.03	15.57	44.30	32.10	32.87
Manikchak	-	9.69	6.46	75.67	8.18	26.25
Kaliachak-I	-	-	5.80	84.42	9.78	41.61
Kaliachak-II	-	13.79	13.24	65.09	7.88	24.71
Kaliachak-III	-	01.03	5.01	90.54	3.42	35.65

Source: Computed from District Statistical Hand Book, Malda, 2001.

CROPPING PATTERN

Generally speaking, cropping pattern refers to the percentage of area under different crops for cultivation. Table 2.5 depicts that, rice is the dominant crop in the district in term of area under its cultivation accounting 57.41 percent of gross cropped area (GCA), while wheat is the next crop accounting 12.79 percent area. But in case of yield, wheat registered better position than rice. Per hectare crop yield of wheat and rice has been recorded at 2511.0 kg. and 2360.0 kg.

respectively. Again oil seeds accounted for only 9.24 percent of gross cropped area and its yield rate is 1067.0 kg. per hectare in the district.

Table 2.5: Cropping Pattern
Malda District
(2000-01)

Crop	Area (in'000 hectares)	Percentage to GCA	Production (in'000 tonnes)	Yield rate (kg. Per hectare)
Rice	221.7	57.41	523.1	2360.0
Wheat	49.4	12.79	124.1	2511.0
Barley	02.2	0.57	01.2	535.0
Maize	03.4	0.88	10.4	3096.0
Gram	07.6	01.97	09.7	1275.0
Other food grains	29.4	7.61	20.2	687.0
Total food grains	313.7	81.23	688.7	2195.0
Rapeseeds & Mustard	34.8	09.01	37.7	1083.0
Other seeds	0.9	0.23	0.4	444.0
Total oil seeds	35.7	9.24	38.1	1067.0
Jute	24.0	6.21	248.2	010.0
Mesta	0.50	0.13	04.3	08.0
Other fiber	0.0	0.0	0.0	0.0
Total fibers*	24.5	6.34	252.5	10306.0
Sugarcane**	05.4	1.40	366.6	67667.0
Potato	02.4	0.62	42.9	17642.0
Other crops	04.5	1.17	03.9	866.7
Total crops (GCA)	386.2	100.0	1392.7	3606.2

*Production in thousand bales of 180 kg. each, **In terms of gur
Source: District Statistical Hand Book, Malda, 2001

OCCUPATIONAL STRUCTURE

The study of occupational structure helps in understanding the stage of cultural advancement reached by a community and the socio-economic condition of inhabitants of the region. Table 2.6 and Figure 2.8 reveal that in the district, the work participation rate is accounted for only 40.75 percent. Among total working population in the district, 20.83 percent are cultivators (both marginal and main cultivators), whereas 30.72 percent population are agricultural labourers (both main and marginal). Only 0.99 percent of the working population have adopt works in registered industries, 9.40 percent works in small scale industries and 15.61 percent engaged in household industries (Table 2.6). It is observed that majority of the working population (more than 51%) are engaged in primary occupations (cultivators and agricultural labourers), while only more 25 percent of the working population engaged in secondary occupation (industrial works) in the

district (Table 2.6). 22.45 percent workers are engaged some unrecognized occupational activities. Table 2.6 also reveals that, more than 59 percent of the total population of the district is unemployed (Fig. 2.8).

Table 2.6: Occupational Structure of Population
Malda District
(2001)

Particulars	Percent (%) to total working population	Percent (%) to total population
Total workers	-	40.75
Cultivators(Both main & Marginal workers)	20.83	08.49
Agricultural labourers (both main & Marginal workers)	30.72	12.52
Household Industry Workers	15.61	06.36
Small scale Industry Workers	09.40	03.83
Registered Industry Workers	00.99	0.40
Other workers	22.45	9.15
Non Workers	-	59.25

Source: Computed from Primary Census Abstract, series-I, 2001, and Statistical Abstract, West Bengal, 2002-03.

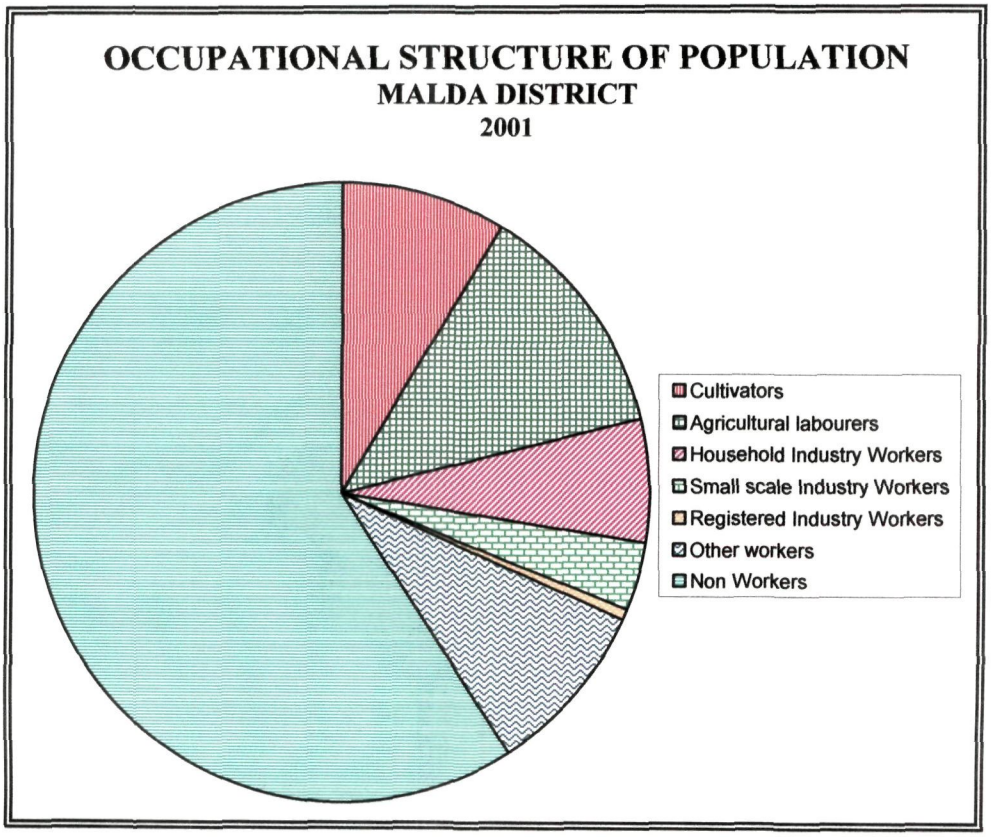


Fig. 2.8

AGRICULTURE

Economy of the district is mainly agriculture based. Yield of agricultural crops varies block wise as a consequence of diversity of physico-cultural factors across the district. Table 2.7 reveals that, among all the crops potato registered higher yield in each blocks though with wide regional variations. However, wheat is more consistent crop as its yield rate is somewhat equal in the blocks. Rice is next to wheat in yield rate which shows wide regional variations in the district. Yield of pulses has been recorded lower than all the major crops under study, which also shows regional inequality. A wide regional variation is recorded in the yield of Mustard. Highest yield of both rice and wheat is registered in Gazole block, i.e., 59.32 quintal/hec. and 29.33 quintal/hec. respectively. While lowest yield of rice (41.62 q./hec) is recorded in Harishchandrapur-I and wheat (22.44 q./hec) in Ratua-I blocks (Table 2.7).

INDUSTRIES

There is no large scale industry in the district. But the small scale industries play an important role in its economy. Most important of them are silk

Table 2.7: Yield of Major Agricultural Crops
Malda District
(2001)

Block	Yield in Quintal per Hectare Cropped Area				
	Rice	Wheat	Potato	Pulses	Mustard
Harishchandrapur-I	41.62	24.81	179.97	9.6	11.26
Harishchandrapur-II	57.22	26.68	214.91	7.42	14.36
Chanchal – I	43.65	26.06	238.48	9.81	12.74
Chanchal-II	49.26	28.93	175.89	7.3	9.35
Ratua-I	44.88	22.44	197.78	9.92	12.2
Ratua-II	47.74	23.09	217.13	8.53	14.99
Gazole	59.32	29.33	145.33	9.12	10.3
Bamangola	50.35	24.33	225.32	5.24	9.0
Habibpur	53.76	25.37	111.59	7.9	9.86
Old Malda	42.9	23.77	153.57	7.84	12.13
English Bazar	54.21	23.49	168.35	10.78	10.47
Manikchak	47.12	25.44	219.7	11.15	12.17
Kaliachak-I	48.19	25.74	181.53	7.65	8.29
Kaliachak-II	48.6	24.43	152.0	8.79	10.65
Kaliachak-III	47.48	24.78	147.65	10.74	8.26

Source: District Statistical Hand Book, Malda, 2001

and tobacco making industries. Only 10 types of industries have been reported which in total accounts 35 in the district, are (i) food processing, (ii) tobacco and beverages manufacturing, (iii) wool, silk and man-made fiber textile manufacturing, (iv) jute and other vegetable fiber textiles (except cotton), (v) paper and paper products, (vi) chemical and chemical products, (vii) non-metalic mineral products, (viii) metal products and parts, except machinery and equipment, (ix) repair of capital goods and (x) storage and warehousing services.

Table 2.8 exhibits that the industries are mainly concentrated in four blocks i.e., English Bazar, Kaliachak-I, Old Malda and Kaliachak-II because of their location near to the district head quarter having good accessibility and connectivity by both road and rail ways, and availability of cheap skilled local labour.

Table 2.8: Distribution of Major Industries
Malda District
(2001)

Block	Number of Major Industries					
	Food Processing	Beverages & Tobacco	Silk & Textile	Chemical Pesticides	Non-metalic Mineral Product	Paper & Paper Product
HCPur-I	0	0	0	0	0	0
HCPur-II	0	0	0	0	0	0
CHCL-I	0	0	0	0	0	0
CHCL-II	0	0	0	0	0	0
Ratua-I	1	2	0	0	0	0
Ratua-II	0	1	0	0	0	0
Gazole	0	0	0	0	0	0
Bamangola	0	0	0	0	0	0
Habibpur	0	0	0	0	0	0
Old Malda	1	2	0	0	1	0
ENGB	2	7	1	1	2	1
Manikchak	0	1	0	0	0	0
Kaliachak-I	0	2	2	0	1	0
Kaliachak-II	0	1	1	0	0	0
Kaliachak-III	0	0	1	0	0	0
Total	4	16	5	1	4	1

Source: District Statistical Hand Book, Malda, 2001, and District Planning Map, Malda, Survey of India.

MARKETS

Market centres plays an important role in the socio-economic development of a region. These are not only the place of exchange of goods and

services rather they act as the centre of exchanging thoughts and ideas. In spatial context they make a linkage between the centre and surrounding settlements. Table 2.9 reveals that 75 daily markets, 151 periodic markets and only 02 regulated markets are distributed in the district. English Bazar block has highest number of daily market i.e., 16 followed by Kaliachak block-II (14), while Ratua-II block has no daily market facility. Inhabitants of Ratua-II block commutes to Ratua-I block for the daily market facility. Highest 20 periodic markets have been accounted in Chanchal-I block followed by Bamangola block (18 periodic market), while Kaliachak-II block has no one (Table 2.9).

Table 2.9: Distribution of Markets and Banks
Malda District
(2001)

Block	Number of Markets			Number of Banks		
	Daily Market	Periodic Market	Regulat-ed Market	Commerci al Banks	Co-operative Commerci al Banks	Agricultu-ral Credit Societies
HCPur-I	03	13	0	01	02	22
HCPur-II	01	11	0	03	0	10
CHCL-I	09	20	01	04	01	10
CHCL-II	02	11	0	03	02	15
Ratua-I	03	08	01	06	03	07
Ratua-II	0	08	0	03	0	01
Gazole	04	16	0	05	02	19
Bamangola	01	18	0	04	03	09
Habibpur	01	15	0	07	08	22
Old Malda	05	02	0	03	06	05
ENGB	16	04	0	19	06	11
Manikchak	04	14	0	05	01	11
Kaliachak-I	07	05	0	07	01	06
Kaliachak-II	14	0	0	04	0	05
Kaliachak-III	05	06	0	06	0	08
Total	75	151	02	80	35	161

Source: District Census Hand Book, Village and Town Directory, 2001.

BANKING

Banking system has a significant place in the socio-economic development of a region as it acts as repositories of the community's savings and purveyors of credit. These two functions of the banks directly influence the economic activities i.e., industries, trade, commerce, agriculture, health, education and so on and therefore the level of development of any region.

Table 2.9 reveals the block wise distribution of banks in the study region. Total 80 commercial banks, 35 co-operative banks and 161 agricultural credit societies have been recorded in the district. Highest 19 commercial banks are located in English Bazar block followed by 07 in Habibpur block, while Harishchandrapur-I block has lowest number i.e., 01. Habibpur block has highest number of co-operative commercial banks, while highest 22 agricultural credit societies have been registered in two blocks i.e., Harishchandrapur-I and Habibpur block. But four blocks i.e., Harishchandrapur-II, Ratua-II, Kaliachak-II and Kaliachak-III have no one commercial bank, however Ratua-II block has only one agricultural credit society (i.e., lowest number).

TRANSPORTATION AND COMMUNICATION

Means of transportation plays an important role in the process of socio-economic development of a region. The district is served by both road and rail ways. The National Highway No.34 that connect Kolkata (capital city) and Siliguri (second largest city of the state and lie in north of the state) passing through the district and total length is 108 km.. National Highway No.81 is newly constructed connecting Harishchandrapur-I and Gazole blocks via Chanchal (Head of Chanchal Sub-Division) and Shamsi.

There are three state high ways in the district. They are 32 km. long connecting Manikchak and English Bazar, 26 km. long passes by the side of Adina and Pandua of Gazole block, and third one is about 32 km. connect Gazole and Bonodpur of Dakshin (south) Dinajpur district. Another important metalled road of 42 km. length connects Gazole, Bamangola, Habibpur and Bulbulchandi. While another road of 16 km. length links Manikchak with Ratua. Ratua is also connected with Tulshihata via Bhaluka by another road.

Railway is an important means of transportation in the district. The main track crosses the district in north-south direction with six main stations i.e., Lakhshipur, Malda Town Junction, Aklahki Junction, Shamsi, Harishchandrapur and Kumedpur Junction. After Kumedpur it is bifurcated into two tracks, one towards Katihar Junction (Bihar) and another towards NJP (New Jalpaiguri). Another newly constructed railway track crosses the district in east-west direction

and joins Aklakhi Junction with Ganga Rampur railway station of Dakshin Dinajpur district.

Table 2.10: Transportation and Communication Facility
Malda District
(2001)

Block	Metalled Road by P.W.D.		No. of Bus Route	No. of Railway Station	No. of Post Office (Branch& Sub Post Office)	No. of Post & Telegraph Office
	Length (in km.)	on per lakh population				
H.C. Pur-I	37.0	22.78	04	02	16	01
H.C. Pur-II	12.0	6.06	02	03	21	0
CHCL-I	44.0	25.26	04	0	20	01
CHCL-II	30.0	18.16	03	01	15	0
Ratua-I	37.0	17.02	05	02	19	03
Ratua-II	55.0	34.18	03	02	19	0
Gazole	45.0	15.27	03	02	36	01
Bamangola	32.0	25.15	02	0	14	0
Habibpur	60.0	31.97	04	02	22	0
Old Malda	36.80	18.95	03	02	12	0
ENGB	35.0	9.03	04	02	29	02
Manikchak	26.0	12.14	02	0	23	02
Kaliachak-I	27.0	8.68	03	03	29	0
Kaliachak-II	40.0	18.92	03	0	17	0
Kaliachak-III	27.50	9.67	03	01	24	02
Total	544.3	16.54	-	23	321	09

Source: Statistical Hand Book, Malda, 2001, and District Census Hand Book, Village and Town Directory, 2001.

Table 2.10 reveals that lowest length i.e., 12.0 km. of metalled road is recorded in Harishchandrapur-II block where only 02 bus routes facilitate the means of transportation to the inhabitants. Again on per population, the length of metalled road is accounted for 6.06 km. in the same block (Harishchandrapur-II). Highest length of metalled road per lakh population i.e., 34.18 km. is recorded in Ratua-II block which has three bus routes, followed by Habibpur block i.e, 31.97 km.. Four blocks i.e., Chanchal-I, Bamangola, Manikchak and Kaliachak-II have not any railway station. Table 2.10 further reveals the block wise distribution of post offices and post and telegraph offices in the district, where it is observed that Gazole block has highest number of post offices i.e., 36 followed by English Bazar (29) and Kaliachak-I (29), while Old Malda has only 12 post offices. Highest number of three post and telegraph offices are recorded in Ratua-I block while eight blocks i.e., H.C.

Pur-II, CHCL-II, Ratua-II, Bamangola, Habibpur, Kaliachak-I, Kaliachak-II, and Old Malda (Table 2.10).

2.4 DEMOGRAPHIC SETTING

Demography is interdisciplinary study of population- especially birth rate and death rate, growth pattern, migration etc. The present analysis is an attempt to study the demographic characteristics of population in Malda district in terms of spatio-temporal variation of population growth, population density, rural-urban differences, sex-ratio, and literacy rate.

POPULATION GROWTH

Table 2.11 and Figure 2.9 reveal a high fluctuation in decadal growth rate of population in the study area. It registered a negative growth rate i.e., –01.77 percent during 1911-1921, which happened only once throughout the demographic history. The high mortality during this period in India was the product of epidemics of influenza, plague, small pox, cholera etc. wherein Malda district was not exceptional one. After that growth rate shows a continuous increasing trend up to 1971 with an exception of declination at 11.05 percent 1941-51 from 17.19 percent in 1931-41. The declination during 1941-51 was due to the partition of India in 1947 subsequently shifting and migration of people to the East Pakistan (presently Bangladesh). After 1971, the district experienced continuous declination of growth rate and finally recorded at 24.78 percent during 1991-2001.

Table 2.11: Decadal Growth Rate of Population

Malda District
(1901-2001)

Year	Total Population	Growth Rate (in %)
1901	603,649	-
1911	698,547	15.72
1921	686,174	-01.77
1931	720,440	04.99
1941	844,315	17.19
1951	937,580	11.05
1961	1,221,923	30.33
1971	1,612,657	31.98
1981	2,031,871	26.00
1991	2,637,032	29.78
2001	3,290,468	24.78

Source: Census of India, 1991, Series-26, West Bengal, Part II-A, & Primary Census Abstract, Series-I, 2001.

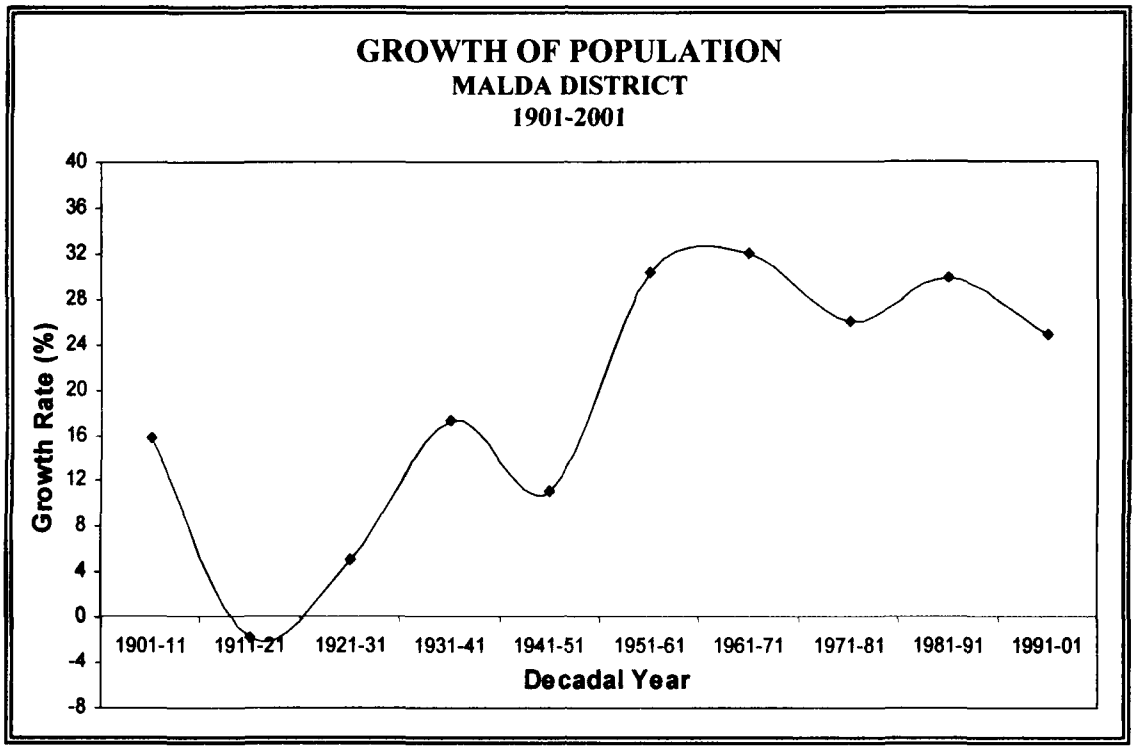


Fig. 2.9

Table 2.12 reveals spatial variations of population growth during 1991-2001 at block level. Old Malda block registered highest decadal growth rate i.e. 33.01 percent in the district followed by Kaliachak-III block (32.44 percent). These blocks recorded growth rate more than the district average i.e., 24.78 percent, state of West Bengal average i.e., 17.77 percent and national average i.e., 21.34 percent. The same table (Table 2.12) shows that, lowest decadal growth rate i.e., 11.43 percent was recorded in Habibpur block followed by 18.29 percent in Bamangola block.

Figure 2.10 depicts the regional variations of population growth in the district. Blocks of the district have been grouped into areas of high, medium and low level of growth of population.

Areas of High Growth of Population (> 27.45)

Five blocks i.e., Ratua–II, Old Malda, Kaliachak–I, Kaliachak–II and Kaliachak–III shows high growth rate of population. Lack of social awareness among the people due to low and medium level of educational development is responsible for higher growth rate of population in these areas.

Table 2.12: Spatial Pattern of Growth and Density of Population
Malda District
(2001)

Block	Growth in percentage (1991-2001)	Density (Persons per sq.km)
Harishchandrapur-I	25.09	948
Harishchandrapur-II	26.08	912
Chanchal – I	21.58	1075
Chanchal-II	24.49	805
Ratua-I	25.17	965
Ratua-II	27.94	1589
Gazole	26.41	574
Bamangola	18.29	617
Habibpur	11.43	473
Old Malda	33.01	840
English Bazar	21.29	1461
Manikchak	20.59	677
Kaliachak-I	27.54	2917
Kaliachak-II	29.01	1011
Kaliachak-III	32.44	1116
Malda District	24.78	918

Source: Computed from Census of India, Primary Census Hand Book, Malda, 1991 and Final Population Tables, West Bengal, 2001.

Areas of Medium Growth of Population (21.93 - 27.45)

It comprises five block of the study area are Harishchandrapur-I, Harishchandrapur-II, Chanchal-II, Ratua-I and Gazole.

Areas of Low Growth of Population (<21.93)

Five blocks of the district registered low rate of growth are, Chanchal-I, Bamangola, Habibpur, English Bazar and Manikchak. Low growth rate in these areas is the consequence of social awareness among the people associated with educational betterment.

POPULATION DENSITY

Population density is a better measurement of spatial distribution of population. It is the out come of man-environmental relationship and reflects socio-economic scenario of the region. Density has been calculated in terms of number of population per square kilometer, taking block as the unit of study which further have been divided into three categories i.e., areas of high, medium and low density of population (Fig. 2.11). Table 2.12 shows that, the highest density of population has been registered in Kaliachak-I block (2917 persons per sq.km.)

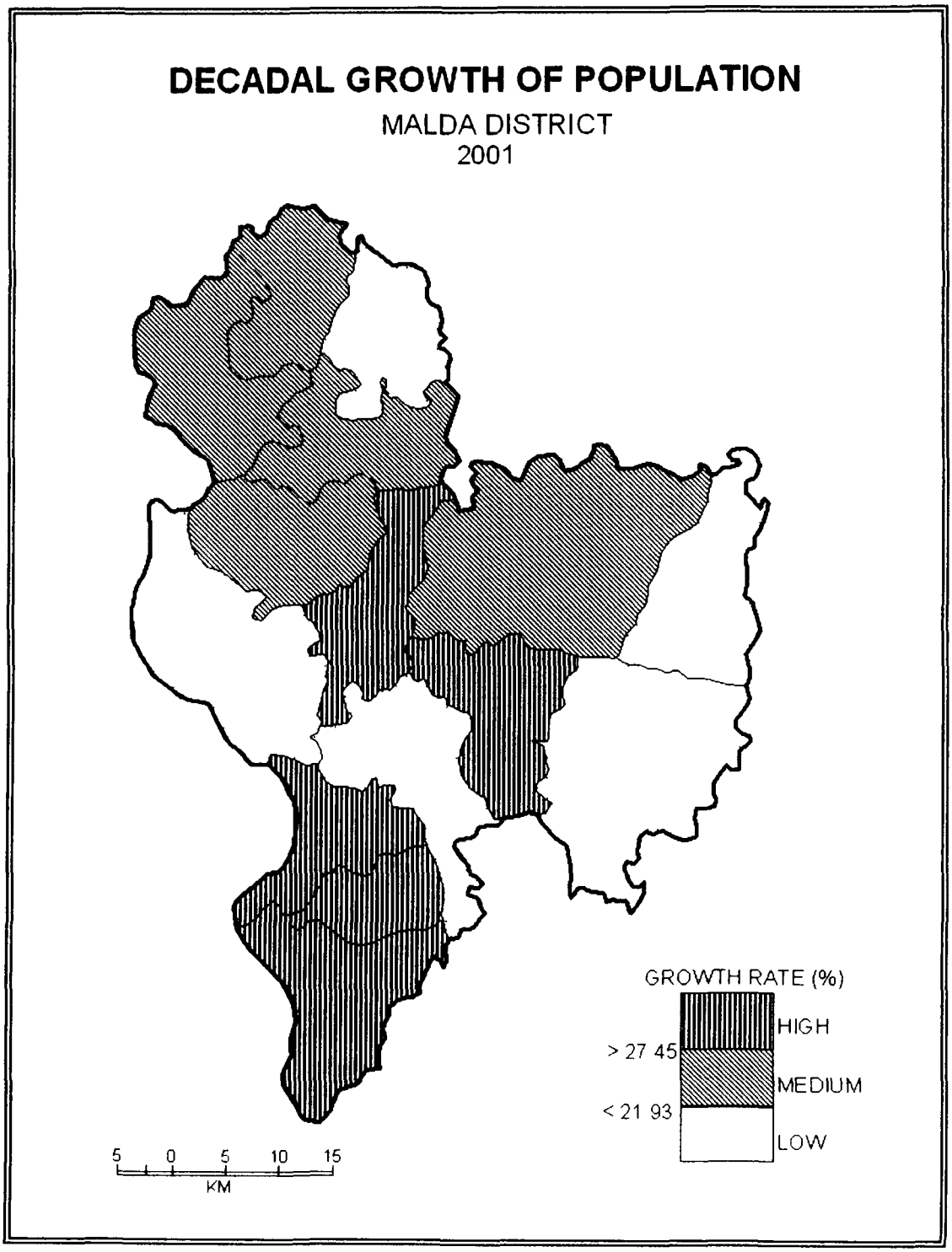

DECADAL GROWTH OF POPULATION
MALDA DISTRICT
2001
GROWTH RATE (%)
HIGH
> 27 45
MEDIUM
< 21 93
LOW
5 0 5 10 15
KM

Fig. 2.10

though the block does not have urban centre, followed by Ratua-II block (1589 persons per sq.km.). Lowest population density recorded in Habibpur block (473 persons per sq.km.).

Areas of High Density of Population (More than 1363 persons per sq. km.)

Three blocks i.e., Ratua-II, English Bazar and Kaliachak-I show high density of population in the district (Fig. 2.11). English Bazar has an urban centre i.e., district head quarter is located with different socio-economic facilities, while rest two blocks are connected having good means of transportation and communication records high density of population.

Areas of Medium Density of Population (767-1363 persons per sq. km.)

Harishchandrapur-I, Harishchandrapur-II, Chanchal-I, Chanchal-II, Ratua-I, Old Malda, Manikchak, Kaliachak-II and Kaliachak-III have medium density of population (Fig. 2.11).

Areas of Low Density of Population (Less than 767 persons per sq. km.)

Three blocks namely Gazole, Bamangola and Habibpur come under the category of low density of population. Low level of cropping intensity and poor marketing facility are the causative factors of low density of population in this region.

RURAL-URBAN DIFFERENCES

Rural-urban differences have been analysed in order to study the variations in socio-economic and cultural life of inhabitants in these two parts of the study area. In the district, rural population dominate over urban population in terms of its number, number of SC and ST population, number of population in age group of 0-6 years, and in work participation rate. It is revealed from the Following table (Table 2.13) that very meager percentages of population are living in urban areas i.e., 07.32 percent in the district. Work participation rate accounted for 41.46 percent in rural areas while 31.73 percent in urban parts. But in literacy rate urban part dominate over rural part. In urban area overall literacy rate accounts 79.28 percent, male literacy rate 84.43 percent and female literacy rate 73.85 percent in against 47.76 percent, 56.58 percent and 38.41 percent respectively in rural area.

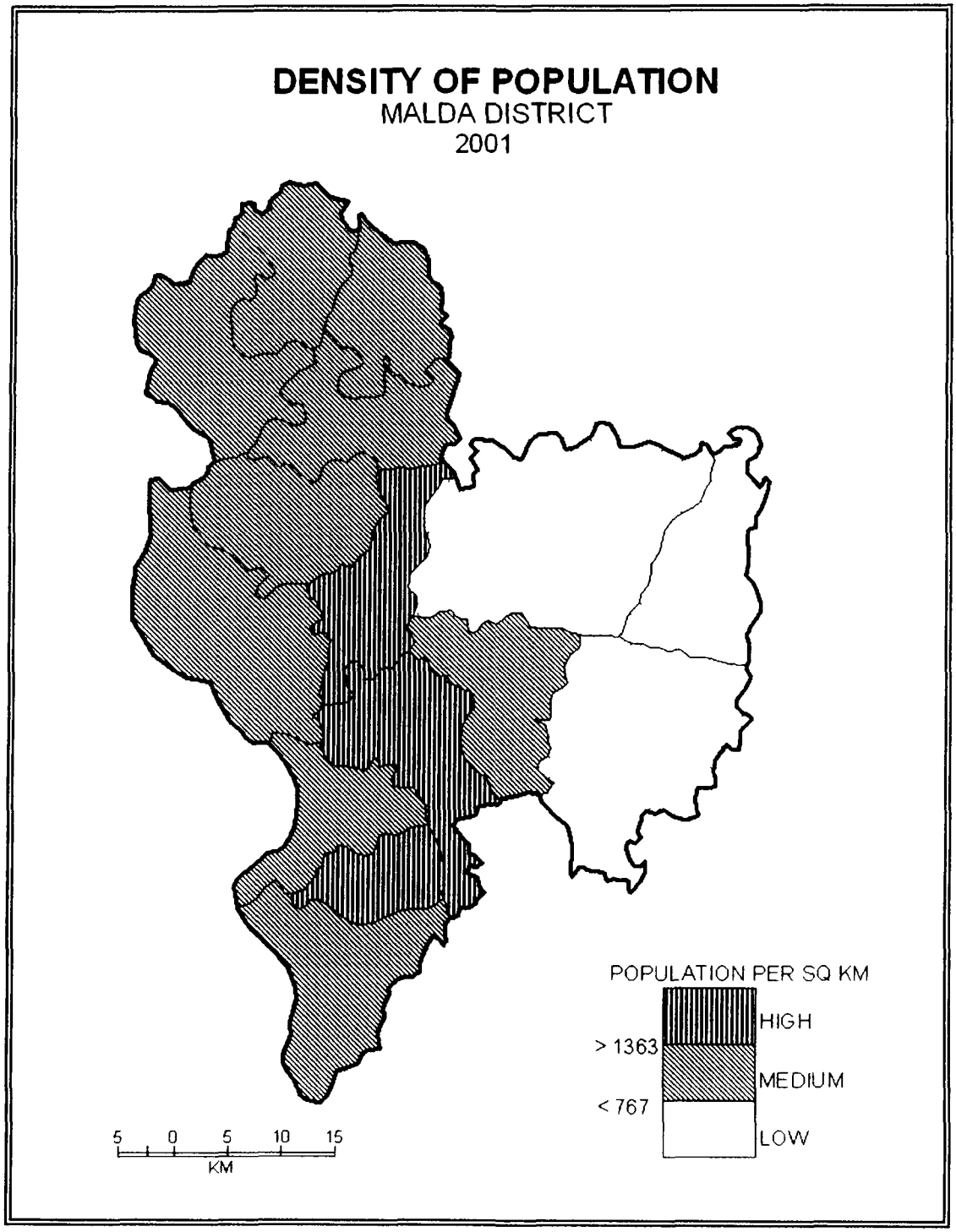

DENSITY OF POPULATION
MALDA DISTRICT
2001
POPULATION PER SQ KM
HIGH
> 1363
MEDIUM
< 767
LOW
5 0 5 10 15
KM

Fig. 2.11

Table 2.13: Rural-Urban Differences
Malda District
(2001)

	Particulars	Rural area	Urban area
1.	Population share (in %)	92.68	07.32
2.	Literacy rate (in %)	47.76	79.28
3.	Male literacy rate (in %)	56.58	84.43
4.	Female literacy rate (in %)	38.41	73.85
5.	Share of SC population (in %)	93.65	06.35
6.	Share of ST population (in %)	98.96	01.04
7.	Population density (persons per sq. km.)	823	9497
8.	Population growth (in %)	24.45	29.16
9.	Share of population in the age group of 0-6 years (in %)	95.45	04.55
10.	Work participation rate (in %)	41.46	31.73
11.	Male work participation rate (in %)	52.69	50.81
12.	Female work participation rate (in %)	29.61	11.59

Source: Computed from Primary Census Abstract, Series – I, 2001.

SEX-RATIO

Sex-ratio is defined as the number of females per thousand males. It is an important indicator to measure the extent of prevailing equality between males and females in a society at a given time.

Table 2.14: Changing Figure of Sex-Ratio
Malda District
(1901-2001)

Year	Total	Rural	Urban
1901	1007	1012	854
1911	1004	1008	861
1921	991	996	802
1931	989	995	814
1941	983	988	827
1951	966	971	853
1961	965	969	873
1971	948	951	896
1981	949	950	927
1991	938	939	924
2001	948	948	947

Source: Census of India, 1991, series-26, West Bengal Part II-A, and Primary Census Abstract, Series-I, 2001.

Table 2.14 reveals that, highest sex-ratio among total population i.e., 1007 and rural population i.e., 1012 was registered in 1901 followed by 1911 when it was 1004 and 1008 respectively. After that it shows continuous declining trend up to 1991. But

this figure is somewhat different in urban part where high fluctuation of sex-ratio is recorded. Lowest sex-ratio in urban part i.e., 802 was recorded in 1921 then a continuous increasing trend was prevailing till 1981 when sex-ratio was 927. In the urban part highest sex-ratio i.e., 947 was recorded in 2001 in the study area.

LITERACY

Literacy is taken as the percentage of literate population to the total population of above 06 years age. Table 2.15 reveals that the district attained 17.61 percent literacy rate in 1971, wherein male and female were 25.45 percent and 9.33 percent literate respectively. After that the literacy rate is steeply increased in each year and finally stood at 50.28 percent in 2001.

Table 2.15: Changing Literacy Rate
Malda District
(1971-2001)

Year	Total population (%)	Male (%)	Female (%)
1971	17.61	25.45	09.33
1981	23.06	31.44	14.22
1991	35.62	45.61	24.92
2001	50.28	58.80	41.25

Source: Computed from Census of India 1971, 1981 & 1991, West Bengal series-26, Part II-A and Primary Census Abstract series-I, 2001.

It is observed that the study area is physico-culturally and socio-economically highly diversified leading to spatial variations of living standard and life style of the inhabitants.

References

1. Government of West Bengal, District Statistical Hand Book, Malda, 2001, p. 01.
2. *Ibid.*
3. Census of India 2001, 'Primary Census Abstract', Series-I.
4. *Ibid.*
5. Census of India 2001, 'District Census Hand Book, Village Directory'.
6. Census of India 2001, Urban Agglomeration.
7. Census of India 2001, 'Primary Census Abstract', Series-I.
8. Census of India 1991, 'Primary Census Abstract, Village and Town Directory', Series - 26, Part XII-A.
9. Official Records, District Agriculture Department, Malda.
10. Official Records, 'Office of the Assistant Engineer, Agriculture and Irrigation', Malda.
11. Census of India 1991, 'Primary Census Abstract, Village and Town Directory', Series - 26, Part XII-A.
12. *Ibid.*
13. *Ibid.*
14. Official Records, 'Office of the Assistant Engineer, Agriculture and Irrigation', Malda.

CHAPTER - 3

SPATIAL ORGANISATION OF SETTLEMENTS

SPATIAL ORGANISATION OF SETTLEMENTS

Shelter is one of the basic needs of human being after food and cloth. For the shelter he selected tree branches, caves or pits or rock cut hiding places. But the safety was in dire need among the people through out the human civilization, subsequently gave the birth to different forms of dwellings to protect themselves from onslaught of nature.[1] As population grow, needs and necessity get multiplied, different forms of visual imprints made by man upon physical landscape came into being in accordance with suitability and feasibility of the people. Thus the concept of organisation of space evolved. Settlement is the man made habitat on the earth's surface representing an organized colony of human beings including the building in which they live or work or store or use otherwise and the tracks and streets over which their movements take place.[2] The settling process during ancient time was the expression of harmony with nature. But with the advancement of civilization human dynamics with nature has brought much more complex in the organisation of space which needs more attention to understand and to formulate certain programme and policies for better and healthy living in the space. Spatial arrangement of settlements is the out come of interplay of physico-cultural and socio-economic factors. The study of spatial organisation of settlements was founded by Demangeon (1920)[3] who developed the concept of spatial organization in term of spatial morphological structure and produced regional classification of rural settlements types. Schaefer (1953)[4] initiated the study of spatial organisation of phenomena in modern trend. Besides him, many studies regarding the analysis of pattern and process of human settlements in discrete ecological settings have been conducted by many scholars who emphasized on the study of spatial organisation of settlements in terms of the analysis of size, shape, spacing and dispersion.[5]

The significance of the study lies to the fact that the settlements are grown in haphazard manner in that proportion that services are facilitated inadequately. Therefore the regional planning at micro-level comes into focus for balanced regional development by providing the adequate facilities to the settlements at economically accessible, socially desirable and environmentally sustainable. Hence the analysis of spacing and dispersion of settlements is significant basis of micro level planning. The analysis of spatial organization of settlement in terms of

its growth, distribution, density, size (in term of population and area), spacing and dispersion of settlements is very essential.

Malda district-study area is physico-culturally diversified one. Pattern and process of settlements growth are not equal in the district hence the accessibility of amenities and facilities to the people are not developed in an organized pattern consequently it generates many socio-economic problems in the district. Therefore in the present study an attempt has been made to examine the spatial organization of settlements in terms of their growth, density, distribution, size (in terms of area and population), concentration and spacing for comprehending the existing position of the region to formulate a planning model for balanced regional development. The objective of the present study is to examine the spatial organisation of the settlements their spacing and concentration.

- The methodological principle adopted for is based on the quantitative techniques i.e., Mather's model of Mean Spacing is as follows:

$$D = 1.0746 \sqrt{A/N}$$

Where, D = theoretical distance between points or settlements in hexagonal arrangement, or mean spacing in unit length.

A = area of given region

N = number of settlement in a given region

1.0746 = Spacing constant.

- The rule of computing 'Gini's Coefficient of Concentration' is as follows:

$$Gi = \frac{1}{10,000} \sum_{i-1}^{N} (x_i.y_i+1) - (x_i+1.y_i)$$

Where, x_i = the cumulative percentage distribution of attribute x.

y_i = the cumulative percentage distribution of attribute y.

N = the number of observations.

Gi = Gini's Coefficient Ratio (the relation between the area of triangle formed between the line of equal distribution and the y axis, and the area lying between the curve and the line of equal distribution)

3.1 GROWTH OF SETTLEMENTS

Growth of settlement refers to the change in number of settlement between two consecutive points of time. There were 1646 settlements out of which 1641 settlements were rural and 5 settlements were urban in Malda district (according to census of India 2001).

Table 3.1 and Figure 3.1 reveal negative growth of settlements i.e., -53.00 and -17.28 percent during 1911-1921 and 1931-1941 respectively. Highest positive growth of settlements i.e., 32.93 percent is observed during 1901-1911 (Fig. 3.1). It has registered growth rate of 0.06 during the last census decade (1991-2001).

The fluctuation trends of growth of settlements are attributed to the reorganisation of the district and inter state and inter district transfer of settlements.

Table 3.1: Growth of Settlements (Rural and Urban)
Malda District
(1901-2001)

Census Year	Settlements	
	Number	Decadal Growth in (%)
1901	2636	-
1911	3504	32.93
1921	1647	-53.00
1931	1713	04.01
1941	1417	-17.28
1951	1579	11.43
1961	1605	01.65
1971	1613	0.50
1981	1619	0.37
1991	1645	01.61
2001	1646	0.06

Source: Census of India, 1991 and 2001.

3.2 DENSITY AND SPACE SIZE OF SETTLEMENTS

The density of settlement is the out come of interplay of physico-cultural and socio-economic condition of the region. It explains the variation of the settlement distribution. The present study focus on the analysis of density of settlements based on the number of settlements at per 10 sq. km. Table 3.2 reveals the average density and average space size of settlements in the district i.e., 4.59 per 10 sq. km. and 2.18 sq. km respectively. Highest density of settlements is recorded in Bamangola block (6.8 settlements) followed by block Harishchandrapur-I (6.1 settlements), Chanchal-I

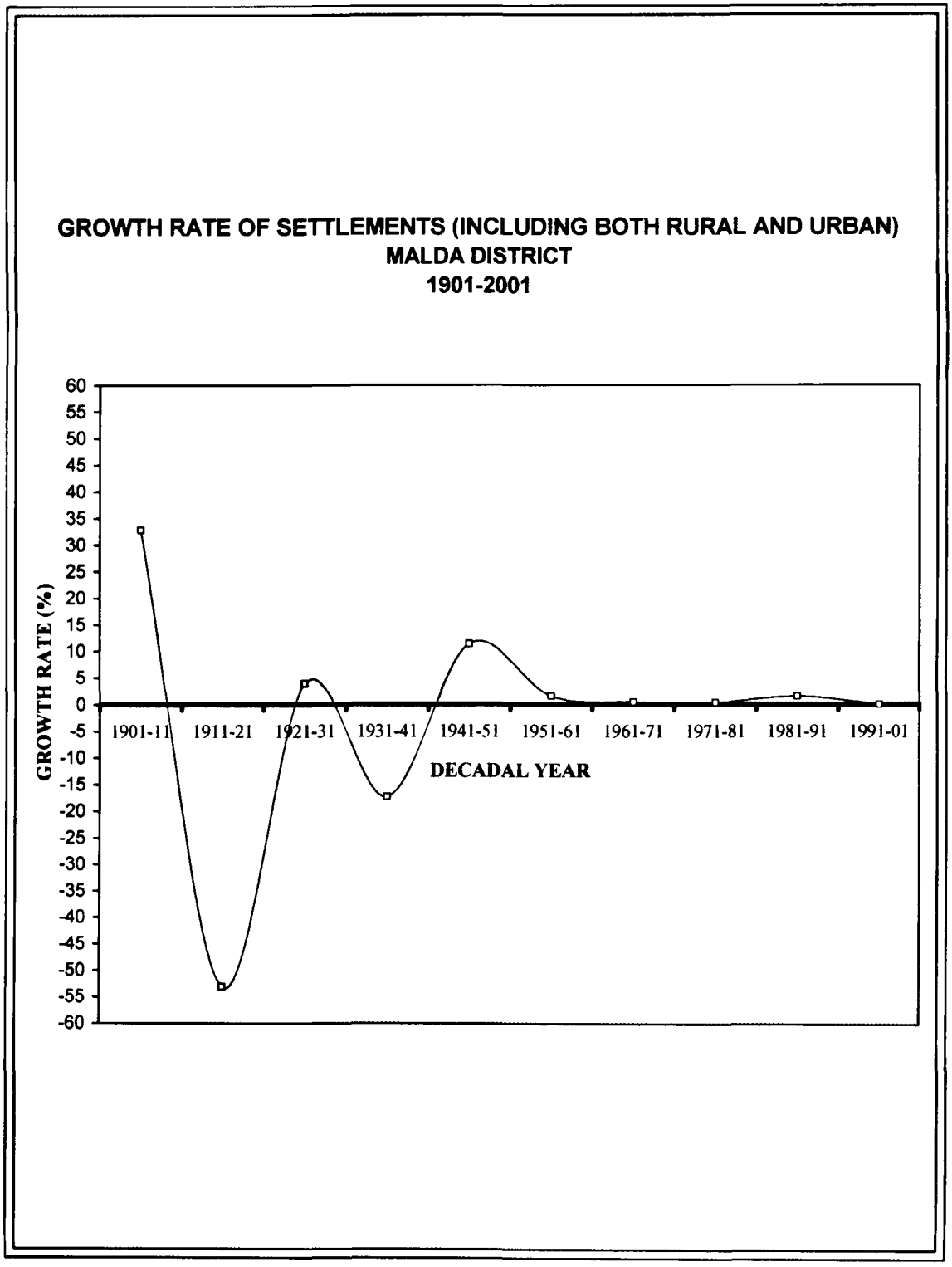

GROWTH RATE OF SETTLEMENTS (INCLUDING BOTH RURAL AND URBAN)
MALDA DISTRICT
1901-2001
GROWTH RATE (%)
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
1901-11
1911-21
1921-31
1931-41
1941-51
1951-61
1961-71
1971-81
1981-91
1991-01
DECADAL YEAR

Fig. 3.1

(6.1 settlements) and Habibpur (5.9 settlements), whereas the lowest density of settlements is found in Manikchak block where only 2.3 settlements are located per 10 sq. km.. Figure 3.2 depicts that northern and eastern part comprising six blocks (i.e., Harishchandrapur-I, Chanchal-I, Kaliachak-I, Gazole, Habibpur and Bamangola) shows high density of settlements, while central part of the district comprising five blocks shows medium density. Western part of the district from north to south comprising Harishchandrapur-I, Manikchak, Kaliachak-II and Kaliachak-III blocks comes under the category of low density of settlements in the study area (Fig. 3.2)

Table 3.2: Density of and Space Size of Settlements
Malda District
(2001)

Block	Density of settlements (settlements/10 sq. km.)	Average space size of settlement (area in sq. km)
Harishchandrapur-I	6.1	1.65
Harishchandrapur-II	3.3	3.02
Chanchal-I	6.1	1.64
Chanchal-II	4.3	2.33
Ratua – I	4.0	2.47
Ratua-II	4.7	2.11
Gazole	5.6	1.78
Bamangola	6.8	1.46
Habibpur	5.9	1.70
Old Malda	5.0	2.00
English Bazar	4.3	2.35
Manikchak	2.3	4.39
Kaliachak-I	5.7	1.75
Kaliachak-II	2.6	3.80
Kaliachak-III	2.6	3.86
Malda district	4.59	2.18

Source: Computed from Census of India, District Census Hand Book, Village Directory, 2001.

Table 3.2 reveals that Manikchak block stood at top with 4.39 sq. km. average space size of settlements, followed by Kaliachak-III block (3.86 sq. km.) and Kaliachak-II block (3.80 sq. km.), while the lowest average space (1.46 sq. km.) is recorded in Bamangola block, followed by blocks Chanchal-I (1.64 sq. km.) and Harishchandrapur-I (1.65 sq. km.).

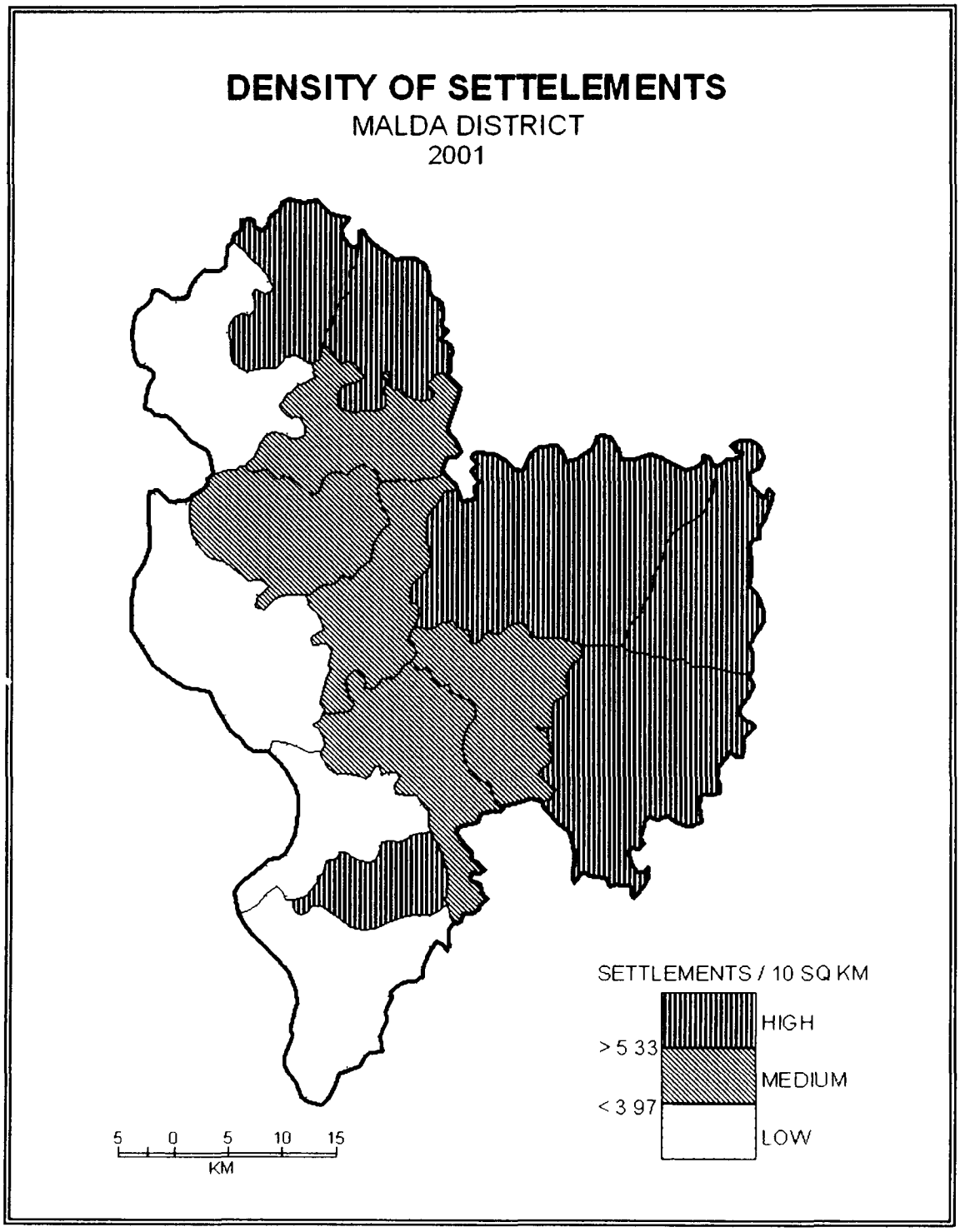

DENSITY OF SETTELEMENTS
MALDA DISTRICT
2001
SETTLEMENTS / 10 SQ KM
HIGH
> 5 33
MEDIUM
< 3 97
LOW
5 0 5 10 15
KM

Fig. 3.2

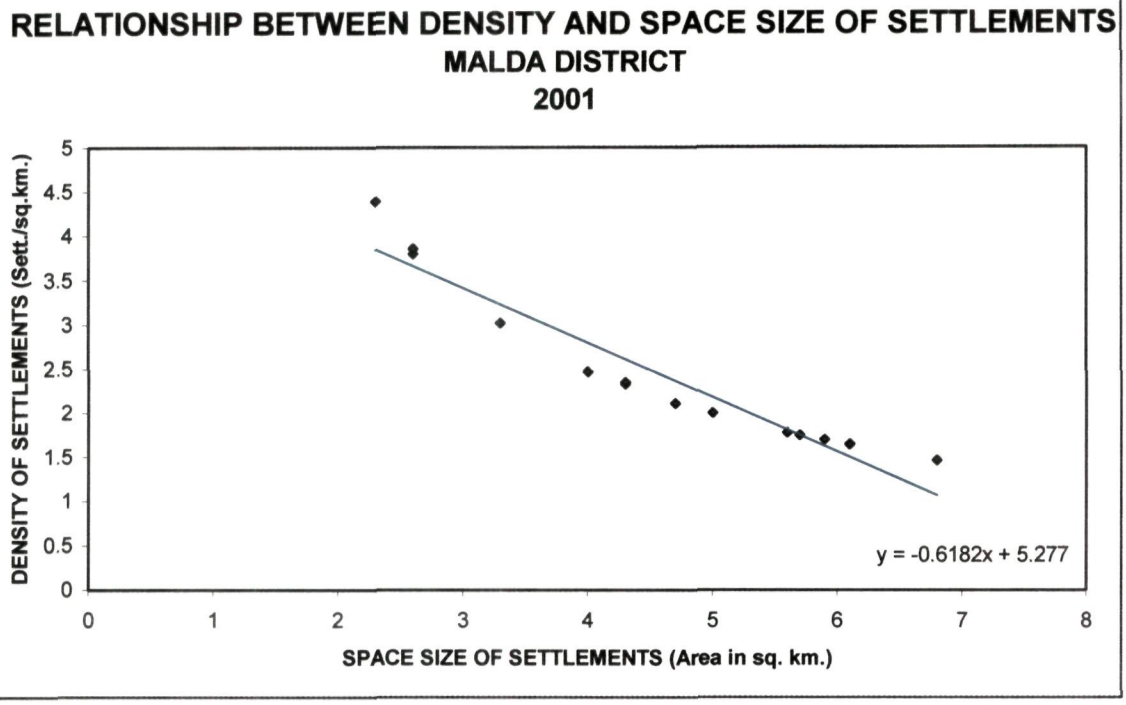

RELATIONSHIP BETWEEN DENSITY AND SPACE SIZE OF SETTLEMENTS
MALDA DISTRICT
2001
DENSITY OF SETTLEMENTS (Sett./sq.km.)
SPACE SIZE OF SETTLEMENTS (Area in sq. km.)
y = -0.6182x + 5.277
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
1
2
3
4
5
6
7
8

Fig. 3.3

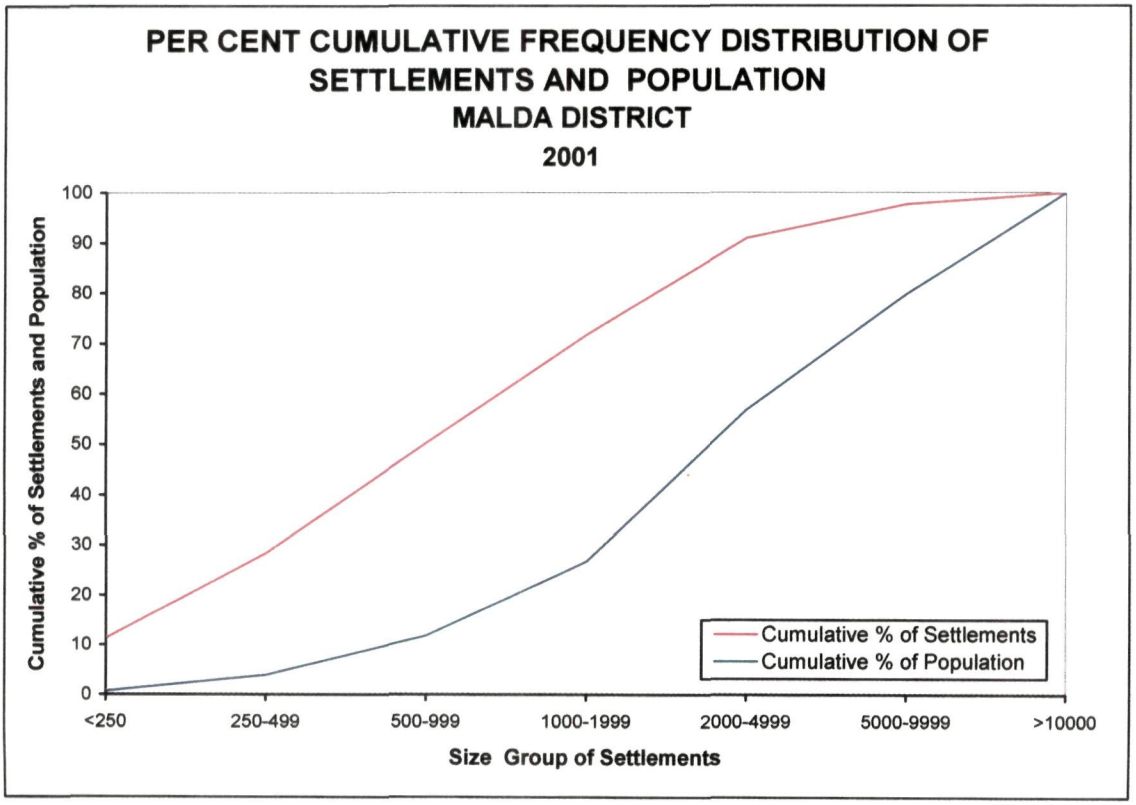

PER CENT CUMULATIVE FREQUENCY DISTRIBUTION OF
SETTLEMENTS AND POPULATION
MALDA DISTRICT
2001
Cumulative % of Settlements and Population
Size Group of Settlements
Cumulative % of Settlements
Cumulative % of Population
0
10
20
30
40
50
60
70
80
90
100
<250
250-499
500-999
1000-1999
2000-4999
5000-9999
>10000

Fig. 3.4

Relationship between Density and Space Size of Settlements

Using the Karl Pearson's technique of Coefficient of Correlation, the analysis reveals that there is a high degree of negative relationship (r = -0.9617) between density and size of settlement. Their correlation is significant at 1 percent level. The inverse relationship infers the fact that small size of settlement records higher density, while low density is found among the large size of settlements. Furthermore density may increase with the decreasing of size of settlements in terms of area. The equation, $y = -0.6316 x + 5.3598$ gives the best fit regression line to determine their linear relationship (Fig. 3.3).

3.3 SIZE OF SETTLEMENTS (in terms of population)

Size of settlements in term of number of population is another aspect regarding the analysis of spatial organization of settlements.

Table 3.3: Distribution of Settlements and Population
Malda District
(2001)

Population size-group (persons)	Settlements			Population		
	No.	Percent	Cumulative Percentage	No.	Percent	Cumulative Percentage
Below 250	189	11.48	11.48	28674	0.87	0.87
250-499	280	17.01	28.49	104402	3.17	4.04
500-999	360	21.87	50.36	258772	7.86	11.90
1000-1999	354	21.51	71.87	491225	14.93	26.83
2000-4999	316	19.20	91.07	990575	30.11	56.94
5000-9999	111	06.74	97.81	755117	22.95	79.89
10000 & Above	36	02.19	100	661703	20.11	100
Total	1646	100	100	3290468	100	100

Source: Computed from Census of India, District Census Hand Book, Village Directory, 2001.

Table 3.3 reveals that, 11.48 percent of the total settlements are small in size having population less than 250 persons in each and accounts only 0.87 percent of the total population. There are only 36 settlements (2.19 percent) with their size of population more than 10,000 persons in each but such settlements accommodate more than 20 percent of total population. As many as 360 settlements (21.87 percent) with population ranging 500 to 999 persons accommodate only 7.86 percent of total population. The analysis also reveals that, more than 50 percent of the settlements with population less than 1,000 persons in each are recorded in the district, but provides accommodation to only 11.9 percent of the population. However, more than

43 percent of population inhabit in only 8.9 percent of settlements which are big size villages and towns with the population more than 5000 in each (Table 3.3).

It is also striking feature that, only 7.32 percent of population are residing in five different urban centres (census of India 2001). English Bazar (Municipality) is the biggest urban centre accommodating 161,456 persons, followed by Old Malda (Municipality) with the population of 62,959 persons, and rest three urban centres, viz, Kachupukur (5343 persons), Kendua (5773 persons) and Aiho (5409 persons) are Census Towns (census of India 2001)[6] The given illustration (Fig. 3.4) depicts the cumulative frequency distribution of settlements and population in different size group of settlements in the district. Figure 3.4 depicts that the cumulative frequency curve of population does not correspondence to that of settlement curve, which means both settlements and population have registered disproportional distribution among the size group of settlements in the district.

Figure 3.5 depicts the block wise distribution of settlements and population, where it is exhibited that, in five (5) blocks, i.e. Harishchandrapur-II, Chanchal-II, Gazole, Bamangola, and Habibpur have no big size of settlement with population more than 10,000 persons. However, only 11 settlements (16.7 percent) with population more than 10,000 persons in each accommodating more than 53 percent of total population recorded in Kaliachak-III block. Another striking feature observed that, not a single settlement with the population more than 5000 persons registered in Bamangola block, whereas 39 percent of settlements with population less 500 persons in each accommodate 13.3 percent of its total population. In Habibpur block, 53.7 percent of total settlements are having population less than 500 persons in each, which provides accommodation to 18.6 percent of its total population. On the other hand, not a single settlement with population less than 250 persons have been recorded in Ratua-II block. It is very much clear from the above discussions that, Gazole, Bamangola, Habibpur and Old Malda blocks have more than 40 percent small size of settlements with population less than 500 persons, but no large size of settlement with population more than 10,000 persons (except Old Malda Municipal town with population 62,959 persons in Old Malda block) have been registered (App. I).

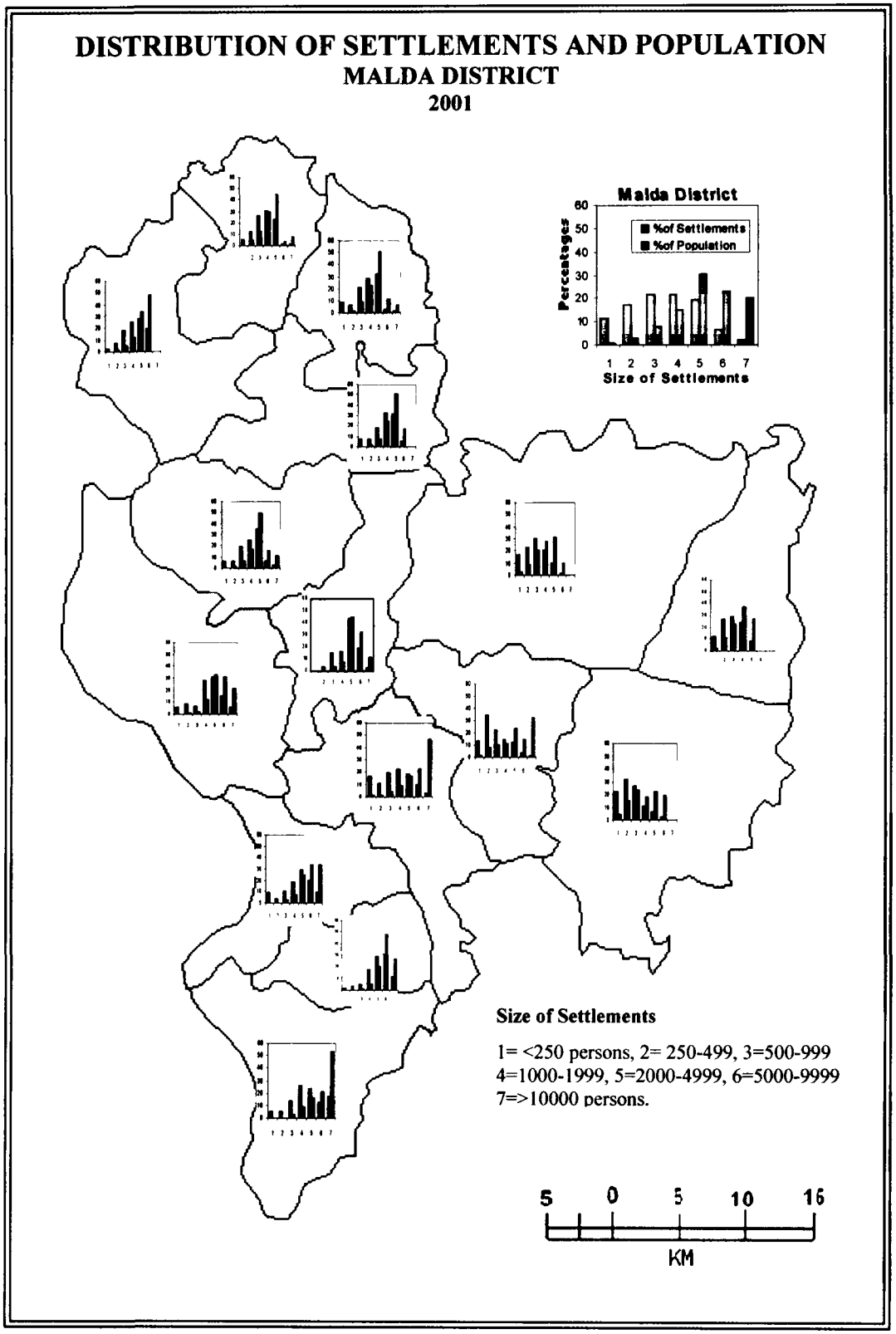

DISTRIBUTION OF SETTLEMENTS AND POPULATION
MALDA DISTRICT
2001
Malda District
%of Settlements
%of Population
Percentages
Size of Settlements
Size of Settlements
1= <250 persons, 2= 250-499, 3=500-999
4=1000-1999, 5=2000-4999, 6=5000-9999
7=>10000 persons.
5 0 5 10 15
KM

Fig. 3.5

3.4 COEFFICIENT OF CONCENTRATION OF SETTLEMENTS AND POPULATION

Coefficient of concentration of settlement in the study area has been determined using Gini's model of Coefficient of Concentration Ratio which helps in assessing the nature of settlements as well as population concentration in different size group of settlements. The overall concentration is measured numerically in terms of the ratio. As per this technique, when the entire population is concentrated at a point the ratio become unity, viz., 1.0, and moving of this ratio from unity to zero explains the distribution pattern is approaching to uniform. When the ratio is zero (Gi = 0) the distribution pattern is completely uniform.

Table 3.4 exhibits the concentration ratio (Gi value) of settlements distribution in the district taking blocks as the unit of study. Gi value of 0.082 reveals approaching uniform distribution of settlements in the study area. However, Table 3.5 reveals the pattern of population concentration among the size group of settlements. The Gi value of 0.580 indicates that the population is disproportionately concentrated at few bigger size settlements in the district.

3.5 SPACING OF SETTLEMENTS

Spacing of settlement is defined as the location arrangement of villages with respect to each other in a given space, hence is closely interlinked with the areal dimension as well as to a certain extent with regional physico-socio-economic condition. Generally speaking, the spacing refers to the average distance at which the settlements of a given region are located apart from each other and their functions are distributed.[7] Actually, the space or pack of settlements is related to the principle of making optimum utilization of available space. The best spacing is said to be emerged when the inhabitants using them well, on the whole, spend least amount of effort required in doing so. The calculation of spacing of settlements was first undertaken by Barnes and Robinson.[8]

In the present study, spacing of settlements has been analysed using Mather's model of mean spacing,[9] who studied the linear pattern of farm population in U.S.A. Mather's spacing is the distance between two nearest settlements located at the centres of equilateral hexagons of equal size and well touched with each other on a geometric and homogenous space. This technique is very helpful in determining the

Table 3.4: Coefficient of Concentration of Settlements by Blocks

Malda District

(2001)

Block	No. of Settlements	Area of settlements in sq. km.	Percent to		Cumulative percentage		$x_i.y_i+1$	$x_i+1.y_i$
			total settlements (x)	Total area (y)	x	y		
H.C.Pur-I	104	171.4	6.3	4.8	6.3	4.8	68.67	51.36
H.C.Pur-II	72	217.2	4.4	6.1	10.7	10.9	164.78	182.03
CHCL-I	99	162.1	6.0	4.5	16.7	15.4	352.37	338.80
CHCl-II	88	205.2	5.3	5.7	22.0	21.1	602.80	580.25
Ratua-I	91	225.2	5.5	6.3	27.5	27.4	830.50	832.96
Ratua-I	48	101.3	2.9	2.8	30.4	30.2	1352.80	1446.58
GZL	288	513.7	17.5	14.3	47.9	44.5	2409.37	2514.25
BMNL	141	206.2	8.6	5.8	56.5	50.3	3452.15	3556.21
HBPur	233	397.1	14.2	11.1	70.7	61.1	4800.53	4747.47
OLM	115	231.2	7.0	6.5	77.7	67.9	5850.81	5744.34
ENGB	113	265.4	6.9	7.4	84.6	75.3	7114.86	6701.70
MNK	72	316.4	4.4	8.8	89.0	84.1	7751.90	7796. 07
KLK-I	61	106.6	3.7	3.0	92.7	87.1	8611.83	8361.60
KLK-II	55	209.2	3.3	5.8	96.0	92.9	9600.00	9290.00
KLK-III	66	254.7	4.0	7.1	100.0	100.0	-	-
Total	1646	3583	100.0	100.0	-	-	Σ52963.37	Σ52143.62

$$Gi = \frac{1}{10,000} \sum_{i=1}^{n} (x_i.y_i+1) - (x_i+1.y_i) = 0.082$$

Source: Computed and compiled from District Census Hand Book, 2001 and District Statistical Hand Book, 2001.

Table 3.5: Coefficient of Concentration of Population by Size group of Settlements
Malda District
(2001)

Population size group of settlements	No. of settlements	Total population	Percent to total population (x)	Percent to total population (y)	Cumulative percentage		$x_i.y_i+1$	$x_i+1.y_i$
					x	y		
Below 250	189	28,674	11.48	0.87	11.48	0.87	46.38	24.79
250-499	280	104,402	17.01	3.17	28.49	4.04	339.03	203.45
500-999	360	258,772	21.87	7.86	50.36	11.90	1351.16	855.25
1000-1999	354	491,225	21.51	14.93	71. 87	26.83	4092.28	2443.41
2000-4999	316	990,575	19.20	30.11	91.07	56.94	7275.58	5569.30
5000-9999	111	755,117	06.74	22.95	97.81	79.89	9781.00	7989.00
10,000 & Above	36	661,703	02.19	20.11	100.00	100.00	-	-
Total	1646	3,290,468	100.00	100.00	-	-	22885.43	17085.2

$$Gi = \frac{1}{10,000} \sum_{i=1}^{n} (x_i.y_i+1) - (x_i+1.y_i) = 0.580$$

Source: Compiled from District Census Hand Book, 2001 and District Statistical Hand Book, 2001.

general spatial pattern of settlement distribution in a given region as it is free from the other complicated and time consuming exercises. Of course, spacing is not a static phenomenon but a dynamic one owing to the presence of diverse physico-cultural and socio-economic attributes.

The computed mean spacing of settlements in each block and in the district as a whole has been given in Table 3.6. The analysis shows that the average inter-settlement distance or the mean spacing of the settlements in the district is 1.58 km. (Table 3.6). Based on the mean spacing of settlements of the district, development blocks have been organised under five categories i.e., very low, low, moderate, high and very high spacing of settlements (Fig.3.6).

Table 3.6: Mean Spacing of Settlements
Malda district
(2001)

Block	Mean Spacing (km.)
Harishchandrapur-I	1.38
Harishchandrapur-II	1.87
Chanchal-I	1.37
Chanchal-II	1.64
Ratua – I	1.69
Ratua-II	1.56
Gazole	1.43
Bamangola	1.30
Habibpur	1.40
Old Malda	1.52
English Bazar	1.65
Manikchak	2.25
Kaliachak-I	1.42
Kaliachak-II	2.09
Kaliachak-III	2.11
Malda district	1.58

Source: Computed by author.

Very Low Spacing (<1.35 km)

Very low spacing of the settlements accounts only one block i.e., Bamangola which covers 5.8 percent (141 sq. km.) area and contains 3.88 percent population of the district, lying in eastern part of the district (Fig. 3.6) and having 8.6 percent of settlements of the district. Average size of the settlements and their density has been recorded at 1.46 sq. km. and 6.8 sq. km. respectively. Well drained and uniform fertility of soil over the region are causative factors for the development of compact

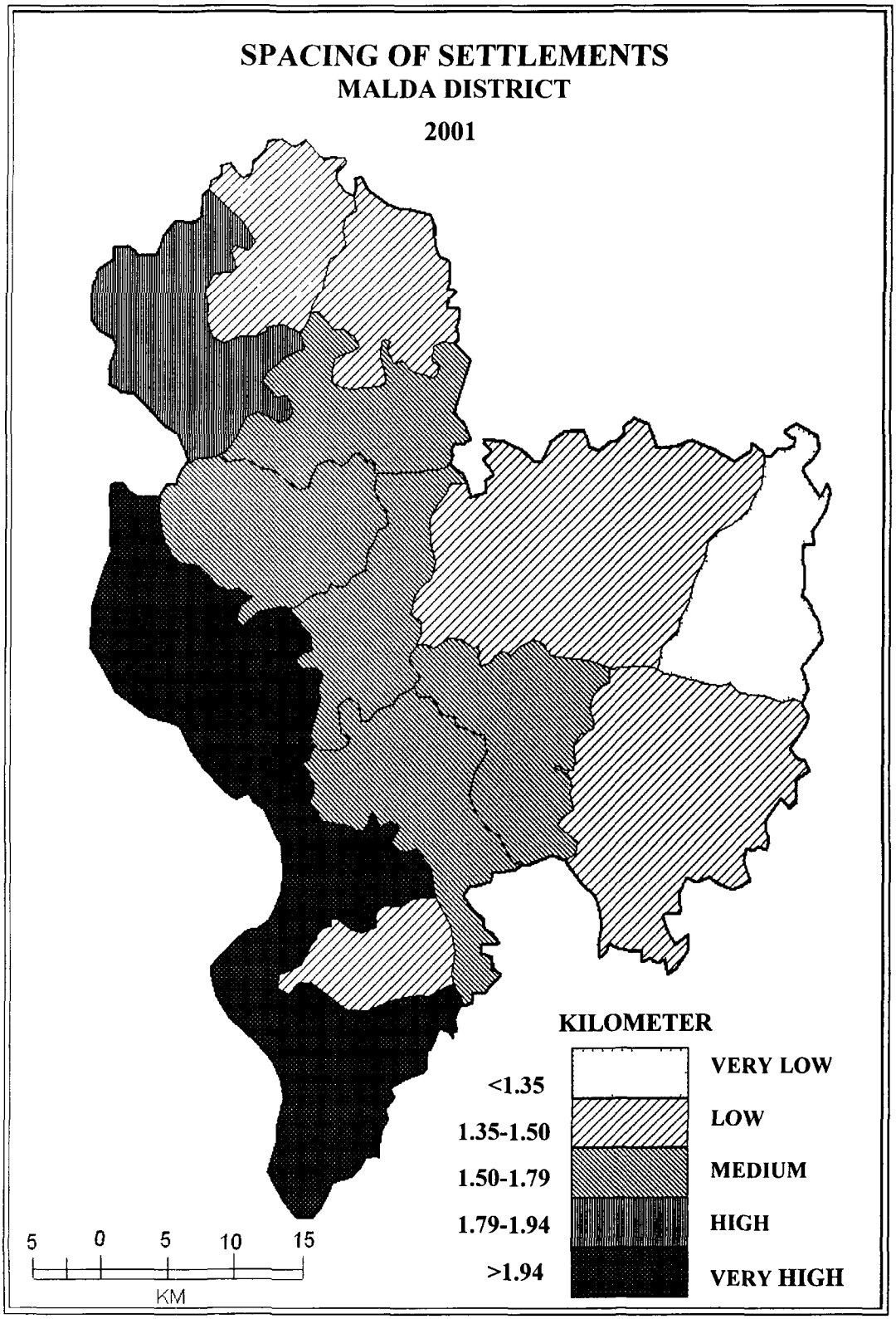

SPACING OF SETTLEMENTS
MALDA DISTRICT
2001
KILOMETER
<1.35
VERY LOW
1.35-1.50
LOW
1.50-1.79
MEDIUM
1.79-1.94
HIGH
>1.94
VERY HIGH
5 0 5 10 15
KM

Fig. 3.6

settlements. Most of the small size of settlements is found along the means of transportation.

Low Spacing (1.35 km - 1.50 km)

Five development blocks of the district registered low spacing of settlements, these are Harishchandrapur-I (1.38 km), Chanchal-I (1.37 km), Gazole (1.43 km), Habibpur (1.40 km) and Kaliachak-I (1.42 km). It covers 1350.79 sq. km. (37.7 %) of the total area consisting of 785 settlements (47.7 %) of the district. It also accounts 34.3 percent population of the district. Low spacing of settlements are mainly found in three different parts of the study area i.e., northern, eastern (except Bamangola block) and southern part of the district (Fig. 3.6). The developments of irrigation facility mainly tube-well irrigation have attributed to the low spacing of settlements.

Moderate Spacing (1.50 km-1.79 km)

This group comprises five development blocks i.e., Chanchal-II (1.64 km), Ratua-I (1.69 km), Ratua-II (1.56 km), Old Malda (1.52 km) and English Bazar (1.65 km). 27.64 percent (i.e., 454) of district's settlements show mean spacing ranging in between 1.50 km. to 1.79 km. It covers 28.7 percent of total area and 34.21 percent of total population of the study area.

High Spacing (1.79 km-1.94 km)

Relatively high spacing value ranging from 1.79 km. to 1.94 km. between the settlements has been identified in single block i.e., Harishchandrapur-II of the district, which occupies 4.47 percent of total area of the district. The settlements of high spacing are found in north-western part of the study area (Fig. 3.6). 6.02 percent of district's population comes under this group. Poor quality of soils, lack of irrigation facility, inadequate means of transportation and communication are the basic causes for higher inter-settlement spacing in block (Harishchandrapur - II).

Very High Spacing (>1.94 Km)

The settlements which are located at more than 1.94 km. apart from each other are included in this group (Table 3.6). Such a very high spacing prevails in three blocks of the district are, Manikchak (2.25 km), Kaliachak-II (2.09 km.) and Kaliachak-III (2.11 km.), which form a compact region stretching from north to south in the western part of the district (Fig. 3.6). It encompasses 777.51 sq. km. (21.7 %) area consisting of 193 settlements (11.7 %) and 21.58 percent population of the

district. This is attributed infertility of soils, lack of irrigational facilities and means of transportation and communication. Highest mean spacing i.e., 2.25 km. has been recorded in Manikchak block, mainly due to the recurrence of devastating floods in every year.

Table 3.7: Correlation (r) between Size and Spacing of Settlements
Malda District
(2001)

Block	Mean spacing (km.) 'X'	Mean size of settlements ('00 persons) 'Y_1'	Mean size of settlements (Sq. km.) 'Y_2'
Harishchandrapur-I	1.38	15.62	1.65
Harishchandrapur-II	1.87	27.50	3.02
Chanchal-I	1.37	17.60	1.64
Chanchal-II	1.64	18.77	2.33
Ratua – I	1.69	23.88	2.47
Ratua-II	1.56	33.52	2.11
Gazole	1.43	10.23	1.78
Bamangola	1.30	9.02	1.46
Habibpur	1.40	8.05	1.70
Old Malda	1.52	16.89	2.00
English Bazar	1.65	34.31	2.35
Manikchak	2.25	29.74	4.39
Kaliachak-I	1.42	50.97	1.75
Kaliachak-I	2.09	38.44	3.80
Kaliachak-III	2.11	43.09	3.86
Total	Σy= 24.68	Σx = 377.63	Σx = 36.31
Computed		'r' = 0.5379, 't' = 2.30	'r' =0.9974, 't' = 3.60

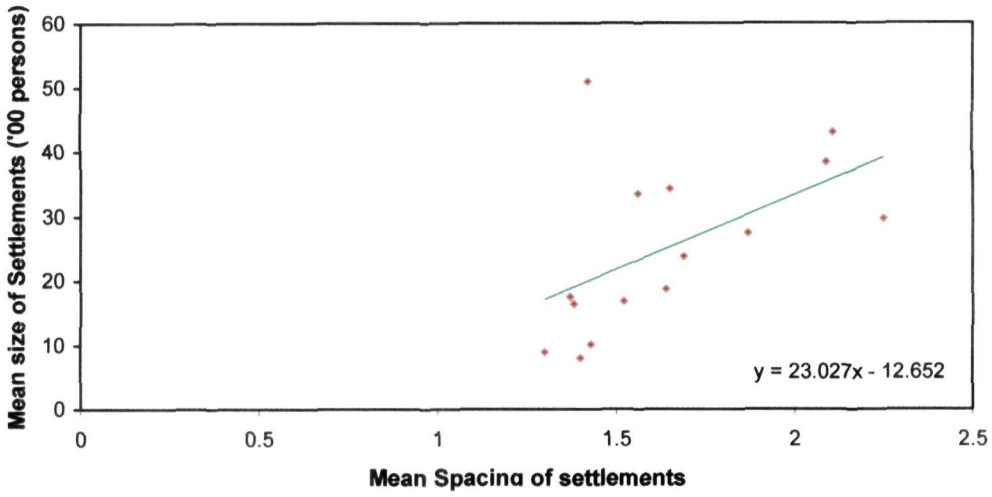
Source: Computed by Author.

RELATIONSHIP BETWEEN SIZE AND SPACING OF SETTLEMENTS

The hypothesis that, spacing is the function of size of settlements is verified with the help of correlation (Karl Pearson's) and regression analysis. The causal association of mean spacing of settlements (in km.) independent variable being the 'X', with dependent variables i.e., mean size of settlements by population being 'Y_1' and mean size of settlements by area being 'Y_2' has been examined taking blocks as the unit of study. Their correlation (Table 3.7) exhibit that both X and Y_1 are positively correlated (r = 0.5379). With applying student's 't' test technique, the calculated 't' value of 2.30 is greater than the tabulated 't' value of 2.16 (5 percent

SCATTER DIAGRAM

RELATIONSHIP BETWEEN SPACING AND SIZE OF SETTLEMENTS
MALDA DISTRICT
2001



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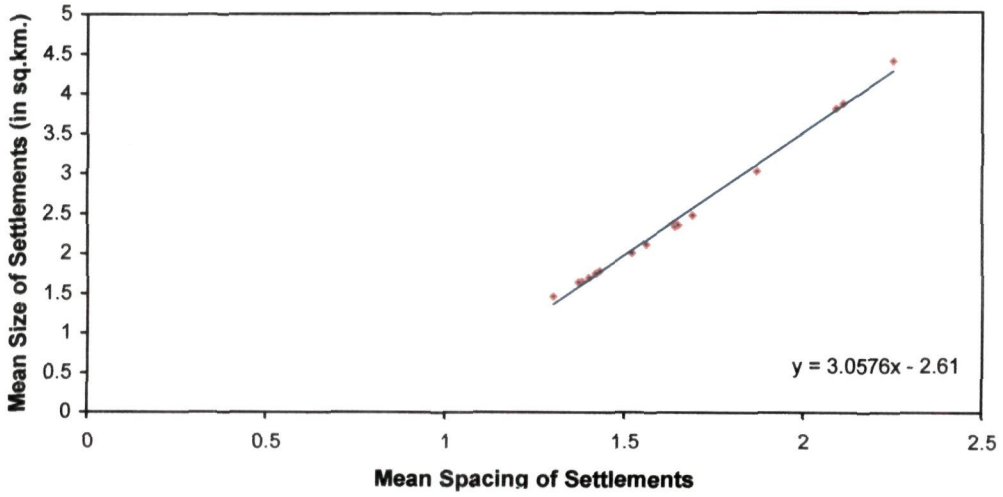

b

Fig. 3.7

level of significance) but less than the tabulated 't' value of 2.65 (2 percent level of significance) at 13 degree of freedom which proves their correlation is significant at 5 percent level. However, the association between X and Y_2 shows high degree of positive correlation (r =0.9974). At 13 degree of freedom their correlation is significant at 1 percent level as their calculated 't' value of 3.60 is greater than the tabulated 't' value of 3.01 (significant at 1% level).

The computed equation, y = 23.027x – 12.652 gives the best fit regression line (Fig. 3.7a) to determine the linear relationship between mean spacing and mean size of settlements in term of number of population, while y = 3.0576x – 2.61 determine the linear relationship between mean spacing and size of settlements in terms of area in sq. km. in the district (Fig. 3.7b). Analysis accepts the general hypothesis and is successesfully proved in the region (Malda district).

It may be ascertained from the foregoing analysis that where spacing is high the settlements are of big sizes in terms of both area and population. However in contrary, low spacing with smaller size of settlements reveals the scattered pattern of distribution.

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CHAPTER - 4

SPATIAL DISTRIBUTION OF SOCIO-ECONOMIC AMENITIES AND FACILITIES

SPATIAL DISTRIBUTION OF SOCIO-ECONOMIC AMENITIES AND FACILITIES

Since the dawn of human civilization, restless efforts are being made to improve the standard of living and quality of life. It is possible only by the social, cultural and scientific advancement in the society. But such advancement is not equal across the earth's surface. The provision of an adequate socio-economic infrastructure and their well accessibility to the mass is prerequisite for their socio-economic well-being as well as development.[1] Such provision may lead to the optimum utilization of space with minimum effort, therefore a high level of spatial organisation of settlements having adequate amenities and facilities could be achieved. But to accomplish it, an emphasis should be given to the econometric and geometric space analysis in regarding the present position of their availability. However, the physical diversity and the lack of efficient transportation and communication are responsible for the spatial variations of facilities required for socio-economic development in a region. Besides, political consideration is also a common practice in allocation of facilities in respective region. Consequently, many of the facilities are concentrated at few of settlements leaving behind other settlements devoid of it. Such a distribution pattern creates socio-economic and cultural diversity even within the small unit of regional boundary.

Many scholars tried to analyse the spatial distribution of amenities and facilities and their significance in regional socio-economic development. Rao and Reddy (1982)[2] and Elhance (1983)[3] adopting quantitative techniques tried to analyse the location pattern as well as spatial variations of amenities and facilities. According to Singh (1994)[4], good availability as well as accessibility of educational and health facilities are prerequisite for the achievement of target of human resource development in a given region as educational institutions are related to the levels of educational attainment and health institutions to health status of inhabitants. Ghosh and Bhadra (2006)[5] viewed that distribution of social functions in a territory is an important field of study in geography, as it is a vital indicator for regional development at any level. Such functions are the essential components required to satisfy the socio-economic demands.

4.1 CLASSIFICATION OF AMENITIES AND FACILITIES

In the present study the existing facilities (i.e., 45) of the region have been organized under the following two heads i.e., main and sub category. In the present study as many as 45 existing services and functions has been taken and categorized into 12 main heads.

Table 4.1: Socio-Economic Amenities and Facilities

Main Category	Name with Abbreviation of Amenities and Facilities
1. EDUCATION	1. Primary School (PS), 2. Middle School (MS), 3. Secondary School (SS), 4. Higher Secondary School (HS), 5. College (Col.), 6. Professional Training Institute(PTI)
2. HEALTH	7. Primary Health Sub Centre (PHSC), 8. Primary Health Centre (PHC), 9. Health Centre (HC), 10. Dispensary (Disp.), 11. Hospital (Hos.), 12. Nursing Home (NH).
3. COMMUNICATION	13. Branch Post Office (BPO), 14. Sub Post Office (SPO), 15. Post and Telegraph Office (PTO), 16. Telephone (Tel.).
4. TRANSPORTATION	17. Fare Bus Stop (FBS), 18. Bus Station (BS), 19. Railway Station (RWS), 20. Pucca Road (PR),
5. MARKET	21. Daily Market (DM), 22. Periodic Market (PM), 23. Regulated Market (RM).
6. ELECTRICITY	24. Electricity for Domestic Purpose (EDP).
7. POTABLE DRINKING WATER	25. Tap Water (TW)
8. AGRO-ECONOMY	26. Electricity for Agriculture (EA), 27. Agricultural Seed Distribution Centre (ASDC), 28, Fertilizer Distribution Centre (FDC), 29. Cooperative Cold Store (CCS), 30. Soil Testing Centre (STC), 31. Agricultural Farm and Research Centre (AFRC), 32. Agricultural Credit Society (ACS).
9. FINANCE	33. Commercial Bank (CB), 34. Cooperative Commercial Bank (CCB).
10. VETERINARY	35. State Animal Health Centre (SAHC), 36. Block Animal Health Centre (BAHC), 37. Additional Block Animal Health Centre (ABHC).
11. ADMINISTRATIVE	38. Block Head Quarter (BHQ), 39. Police Station (PSt.), 40. Sub Division Office (SDO), 41. District Head Quarter (DHQ).
12. RECEREATION	42. Park (Prk.), 43. Public Library (PL), 44. Free Reading Room (FRR) and 45. Cinema Talkies (Cin.)

Note: Abbreviation under bracket indicates the name of service and function, which are referred to the list of abbreviations.

4.2 SPATIAL ANALYSIS OF SERVICES AND FACILITIES

Spatial analysis of socio-economic services and functions has been examined taking into consideration their numeral distribution, mean spacing of

settlements having facility (general space-distribution), cumulative frequency distribution of settlements having facility among the size class of settlement and coefficient of concentration (Gini's) of facilities among the size group of settlements.

The spatial distribution of facilities among the size group of settlements have been high lighted through two frequency curves taking percentage of inhabited settlement and settlement located with facility, wherein the deviation explains the lack of availability of facility among the size class of settlements (i.e. higher the gap higher is the lack of facility and vice-versa).

4.2.1 Educational Facilities

Education is one of the important factors of socio-economic and cultural development. It provides economic opportunities and helps to overcome social barriers, increase inherent potential and productivity for gaining employment, consequently bring down the socio-economic inequalities in the region. In making the planning strategies, not only the problems of the investment cost of education[2] should be taken into account but the location planning should be considered as one of the most important bases so that wastage in education can be prevented and maximum benefit may be availed.

The available establishment units providing educational facilities in the district include primary school, middle school (up to class VIII) secondary school (up to class X), higher secondary school (up to class XII), College (graduate) and professional training institution.

Primary School

There are 1902 primary schools (PS) distributed in 1134 inhabited settlements in the district (Table 4.2). On an average, population of 1730 persons (Table 4.3) is served by each primary school. It is also observed from the table 4.3 that the mean spacing (based on Mather's model) of settlements having primary school are located at mean spacing of 1.91 kilometers. Gi value (Gini's Coefficient Concentration Ratio) of 0.177 indicates that it is not concentrated at big size of settlements rather approaching uniformly distributed at each size class of settlements. Figure 4.1a reveals that the cumulative frequency curve of settlements having primary school is more or less corresponding to the frequency curve of all

inhabited settlements indicates its quite uniform distribution at each size group of settlements in the district.

Table 4.2: Percentage Distribution of Settlements by their Size Group of Population Located with Education Facilities

Malda District

(2001)

Population size group (Persons)	All settlements		Per cent settlements by Educational facility					
	No.	%	PS	MS	SS	HS	Col	PTI
< 250	189	11.48	3.79	0	0	0	0	0
250-499	280	17.01	12.52	2.64	02.17	0	0	0
500-999	360	21.87	20.63	9.06	07.06	04.65	0	0
1000-1999	354	21.51	25.31	17.74	14.68	04.65	28.57	0
2000-4999	316	19.20	25.04	36.60	36.41	30.23	0	0
5000-9999	111	6.74	9.62	23.02	25.0	37.21	0	50.0
>10,000	36	02.19	03.09	10.94	14.68	23.26	71.43	50.0
Total percent	-	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total number of settlements	1646	-	1134	265	184	43	07	02
Total number of institutions	-	-	1902	309	217	62	08	03

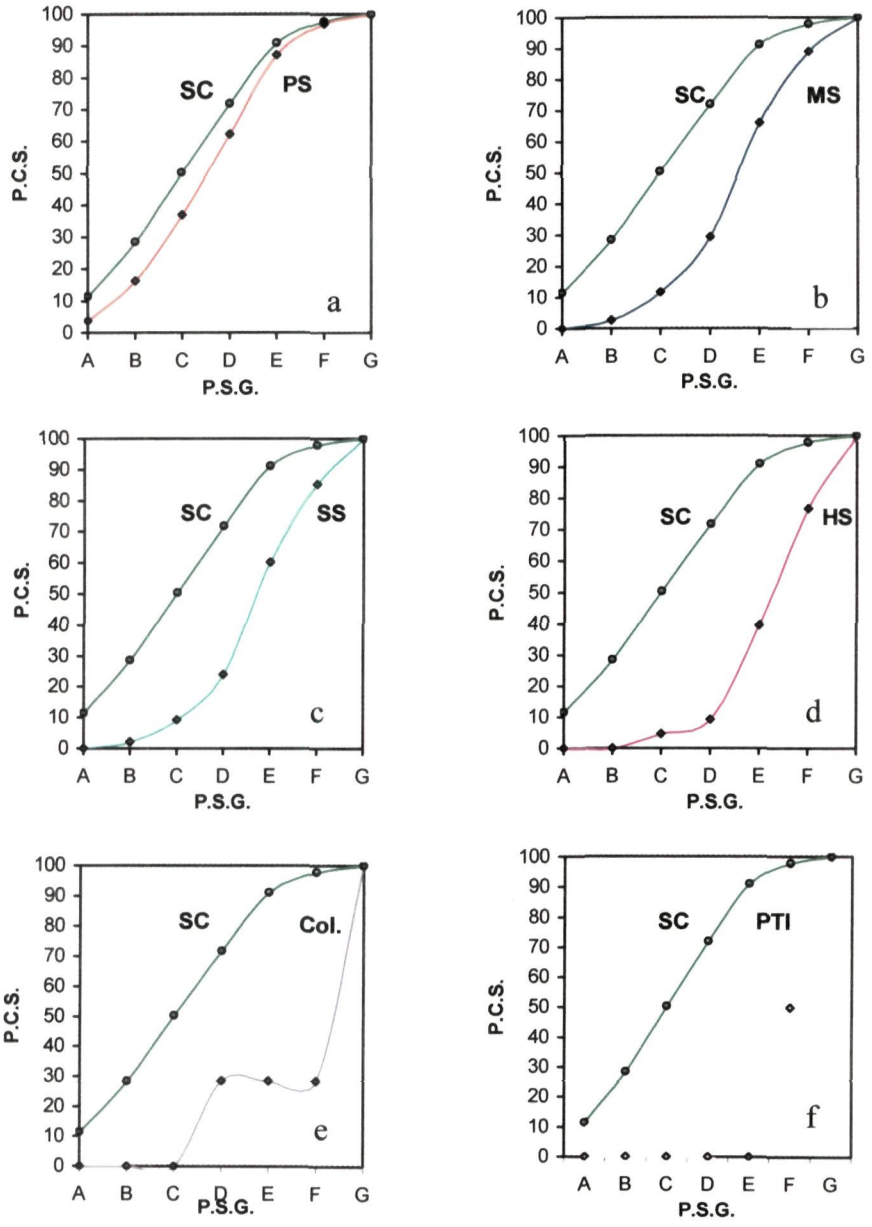
Source: Computed from District Census Hand Book (Village directory), 2001.
Abbreviations used for the names of facilities refer to the list of abbreviations.

Middle School

In the educational system of West Bengal state, middle school (MS) provides the education facility up to class VIII (8^{th}). Total 309 MS are distributed in 265 settlements, but no settlement with population less than 250 persons posses this facility. The following table (Table 4.2) reveals that more than 70 per cent of the settlements with middle school are having population more than 2000 person in each, while only 28 per cent of all inhabited settlements are accounted with population more than 2000 persons in each. Table 4.3 reveals that, it provides education facility to an average population of 10,649 persons, and the settlements having middle school are located at mean spacing of 3.95 km.. The Gi value of 0.546 indicates its quite disproportional concentration at bigger size settlements. The deviations of frequency curve of settlements having middle school from that of all settlement reveals higher lack of this facility in the small size group of settlements than the bigger one (Fig. 4.1b).

SPATIAL DISTRIBUTION OF EDUCATIONAL FACILITIES, MALDA DISTRICT 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements; P.C.S. = Per cent Inhabited Settlements by Population Size Group
A = < 250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.1

Secondary School (SS)

Secondary school provides the education facility up to class X (10^{th}) level. In the district, there are 217 institutions distributed in 184 inhabited settlements (Table 4.2) and available to an average population of 15,163 persons. Mean spacing of the settlements with this facility is recorded at 4.74 km. They are concentrated at big size of settlements (Gi = 0.599). Figure 4.1c reveals same explanation as figure 4.1b in regarding the distribution of secondary school.

Higher Secondary School

In the education system of West Bengal, higher secondary schools provide the education facility up to class XII. Total 62 higher secondary schools are located in 43 inhabited settlements (Table 4.2) in the study area. On an average 53,072 persons population are served by each unit of it (Table 4.3). No settlement with population below 500 persons possesses higher secondary school (Table 4.2). The distribution of this facility is unequal among different size group of settlements. 0.740 is the Gi value reveals its higher concentration at bigger size and few numbers of settlements are widely spaced with mean spacing of 9.81 km (Table 4.3). The deviation of frequency curve of settlements having higher secondary school from that of all inhabited settlements is higher at small size group of settlements than the bigger size reveals disproportional concentration of this facility at later (Fig. 4.1d).

College (Col.)

Colleges provide the graduate level education (Bachelors degree) facility. Total 08 colleges are there in 07 inhabited settlements in the district. Each college provides education facility to an average population of 411,308 persons. One interesting feature of its distribution is that two settlements with this facility are with the population ranging 1000 to 1999 persons in each (i.e. Shamsi College in Ratua-I and Pakuahat College in BMNL block are found) while rest five settlements with college are with population more than 10000 persons in each. No settlement with population ranging from 2000 to 9999 persons possesses this facility. The Gi value of settlements located with it is 0.762, and their mean spacing is 24.31 km. (Table 4.3). Besides, Figure 4.1e depicts the disproportional

concentration of colleges at big size of settlements while small size of settlements are lacking.

Professional Training Institute (PTI)

Professional training institute includes the educational training college and college of technical courses. Out of total three PTI in the study area, two located in English Bazar (District Head Quarter). 0.933 is Gi value refers their distribution is near to clustered (Table 4.3). The same explanation regarding their spatial distribution may be drawn from the Figure 4.1f.

4.2.2 Health Facilities

Health is a state of soundness of mind and body of an individual in which he feels free from any sort of disorder pain of sickness and all organs of body function well and conducive for efficient and prolonged life. Health is the most important and essential aspect of socio-economic development that is the basic need of people for social well being.

The existing institutions that provide health facilities in the district are primary health sub-centre, primary health centre, health centre, dispensary, hospital and nursing home.

Primary Health Sub-Centre

Primary Health Sub-Centre (PHSC) is one of the health care units for rural areas. There are 225 PHSC distributed in 214 inhabited settlements (Table 4.4) to facilitate an average population of 14,624 persons in the district (Table 4.3). The same table (Table 4.3) exhibits that, the mean spacing of settlements with PHSC is 4.40 km. and Gi value is 0.368 which indicates that it is neither uniformly distributed nor highly concentrated at big size settlements rather its concentration is approaching uniform. The same distribution pattern is observed from the lesser gap between both the frequency curves of settlements having PHSC and all inhabited settlements in each size group of settlements in the district (Fig.4.2a).

Primary Health Centre

Primary health centres (PHC) are the treatment cum-administrative establishments of the health department. Total 48 units of primary health centres are distributed in 48 inhabited settlements. More than 33 per cent of settlements

with PHC are big in size having population more than 5000 persons in each. Each unit serves an average population of 68,551 persons and the settlements having PHC are located at 9.28 km. apart from each other (Table 4.3). Distribution of this facility is neither clustered nor uniform (Gi value 0.521). Quite higher deviation of frequency curve of settlements with PHC from that of all settlements reveals lack of it among small size group of settlements (Fig. 4.2b).

Table 4.3: Spatial Distribution of Socio-Economic Amenities and Facilities
Malda District
(2001)

Sl. No.	Name of the facility in abbreviation	Mean Spacing (in km.) of settlement with facility	Average population per facility	Gi value of settlement with facility
1.	PS	01.91	1730	0.177
2.	MS	03.95	10,649	0.546
3.	SS	04.74	15,163	0.599
4.	HS	09.81	53,072	0.740
5.	Col.	24.31	411,308	0.762
6.	PTI	45.48	1,096,823	0.933
7.	PHSC	04.40	14,624	0.368
8.	PHC	09.28	68,551	0.521
9.	HC	26.26	470,067	0.483
10.	Disp.	05.36	9,040	0.492
11.	Hos.	24.31	365,607	0.853
12.	NH	28.77	173,182	0.769
13.	BPO	03.89	11,465	0.533
14.	SPO	12.61	96,778	0.838
15.	PT	21.44	365,607	0.758
16.	Tel	02.83	6,389*	0.354
17.	FBS	03.40	9,191	0.289
18.	BS	14.38	164,523	0.707
19.	RWS	13.41	143,064	0.614
20.	PR	02.73	5,939*	0.224
21.	DM	07.43	43,873	0.702
22.	PM	05.23	21,791	0.442
23.	RM	45.48	1,645,234	0.804
24.	EDP	01.79	2,561*	0.096
25.	TW	04.93	19,356*	0.465
26.	EA	02.61	5,430*	0.248
27.	ASDC	09.19	40,623	0.751
28.	FDC	03.91	3,081	0.533
29.	CCS	45.48	1,645,234	0.556
30.	STC	64.32	3,290,468	0.978
31.	AFRC	21.44	329,047	0.778
32.	ACS	05.13	20,438	0.478
33.	CB	07.98	41,131	0.709
34.	CCB	12.38	94,013	0.678

35.	SAHC	32.16	822,617	0.641
36.	BAHC	16.61	219,364	0.748
37.	ABHC	16.08	205,654	0.507
38.	BHQ	16.61	219,364	0.772
39.	P St.	19.39	299,133	0.843
40.	SDO	45.48	1,645,234	0.978
41.	DHQ	64.32	3,290,468	0.978
42.	Prk	45.48	1,096,823	0.933
43.	PL	06.43	31,338	0.616
44.	FRR	06.43	31,639	0.616
45.	Cin.	12.86	99,711	0.791

Source: Computed by author.

Note: Total geographical area of the district considered as 3583.03 sq. km. and population 3,290,468 persons.

*Functions are not counted in number, rather counted as average population per settlement located with the function.

Mean Spacing (in km.) of settlements with the function, computed based on Mather's Model of Mean Spacing.

Gi value or Gini's coefficient concentration ratio of settlements with the function in size class of settlements and the total inhabited settlements of that size class.

Abbreviation used for the name of functions refers to the list of abbreviations.

Health Centre

There are only 07 health centres (HC) in the district distributed among 06 inhabited settlements. Out of it, 04 settlements are having population ranging between 2000 to 4999 persons in each and one settlement having population more than 10,000 persons while rest one settlement of the size group 250 to 499 persons (Table 4.4). On an average 470,067 persons are being served by each unit of health centre. The settlements having it are located at the mean spacing of 26.26 km. Though this facility is available at wide space but not highly concentrated at big size of settlements (Gi value is 0.483). Figure 4.2c depicts that, the frequency curve of settlements by their size groups of population, having HC does not corresponds to that of all settlements of the district .

Dispensary

There are 364 dispensaries (Disp.) distributed among 144 settlements in the district (Table 4.4). Each unit provides medical facility to an average population of 9,040 persons. 5.36 km. is the mean spacing of settlements having dispensary (Table 4.3). Gi value 0.492 reveals that it is neither disproportionately concentrated nor uniformly in each size group of settlements which is clear from

the small deviation of frequency curve of settlements having dispensary from that of all settlements (Fig. 4.2d).

Table 4.4: Percentage Distribution of Settlements by their Size Group of Population Located with Health Facilities

Malda District

(2001)

Population size group (Persons)	All settlements		Per cent settlements by Health facility					
	No.	%	PHSC	PHC	HC	Disp.	Hos.	NH
< 250	189	11.48	0.47	0	0	1.39	0	0
250-499	280	17.01	8.88	6.25	16.67	2.08	0	0
500-999	360	21.87	12.15	6.25	0	9.72	0	0
1000-1999	354	21.51	24.30	18.75	0	21.53	0	0
2000-4999	316	19.20	34.11	35.42	66.67	38.89	28.57	60.00
5000-9999	111	6.74	15.89	20.83	0	15.28	28.57	0
>10,000	36	02.19	4.20	12.50	16.66	11.11	42.86	40.00
Total percent	-	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total number of settlements	1646	-	214	48	06	144	07	05
Total number of establishment	-	-	225	48	07	364	09	19

Source: Computed from District Census Hand Book (Village directory), 2001.

Hospital

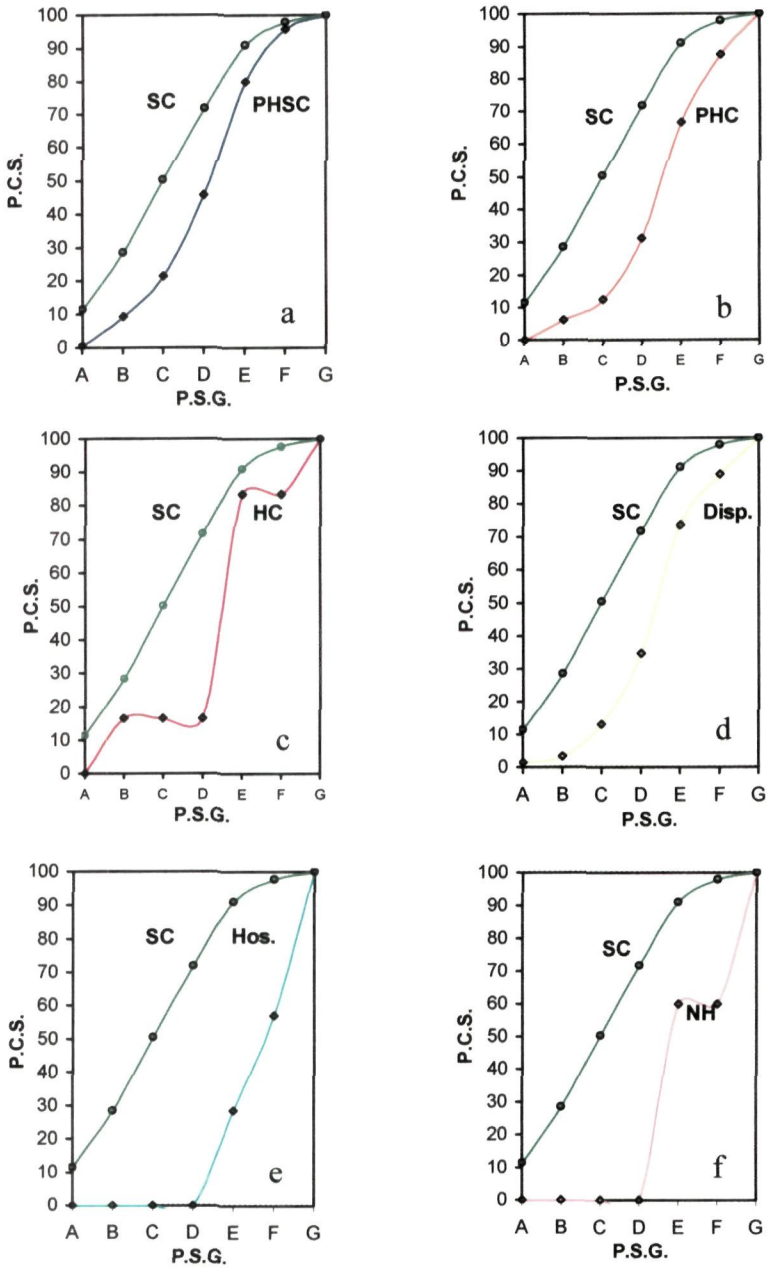
Hospital (Hos.) is the medical unit that renders high order health care facility. There are as many as 09 hospitals located in 07 settlements in the district (Table 4.4) and each hospital serves an average population of 365,607 persons. No hospital is found in the settlement having population less than 1,999 persons. It is available at larger distance from each other as the mean spacing of settlements located with hospital is recorded at 24.31 km. While Gi value 0.853 reveals its higher concentration at few bigger size settlements (Table 4.3). Figure 4.2e depicts the lack of hospital facility more among small size group of settlements than bigger size.

Nursing Home

Nursing home (NH) is the private medical unit of high order health care facility. There are as many as 19 nursing homes located in five different settlements in the district (Table 4.4) to facilitate an average population of 173,182 persons (Table 4.3). English Bazar (District Head Quarter) alone possesses 15 NHs. Table 4.3 exhibits that the mean spacing of settlements having NH is 28.77

SPATIAL DISTRIBUTION OF HEALTH FACILITIES, MALDA DISTRICT 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements; P.C.S. = Per cent Inhabited Settlements by Population Size Group
A = < 250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.2

km. and Gi value 0.769 indicate its higher concentration at few big size settlements, is also revealed from the Figure 4.2f.

4.2.3 Communication Facilities

Communication facility plays an important role in socio-economic development of a region. The movement of information, thought and ideas from one place to another is the function of communication facilities. The existing establishment units facilitating communication services include branch post office, sub-post office, post and telegraph, and telephone.

Branch Post Office (BPO)

Branch Post Office (BPO) is the institution where one can purchase postcards, envelops, stamps etc. and can send and receive money orders. There are 287 branch post offices distributed in 273 inhabited settlements in the district (Table 4.5). Each BPO serves an average population of 11,465 persons and the settlements having BPO is located at an average spacing of 3.89 km. (Table 4.3). The analysis of coefficient of concentration of settlement having BPO reveals that, it is disproportionately distributed among the size group of settlements (Gi value 0.533) which is clearly observed from the Figure 4.3a wherein gap between both frequency curves (curves of all settlements and the settlements having BPO) in the small size group of settlements is wider than in the bigger size of settlements.

Sub-Post Office (SPO)

In addition to the facilities available in BPO, sub post offices provide facilities of sending registered letter, savings of accounts and telephone and telegraphic facilities. Table 4.5 reveals that 34 sub-post offices are distributed among 26 inhabited settlements, however the settlements having population less than 999 persons does not possess it. Spatial pattern of its distribution shows that, the settlements having SPO are located at the mean spacing of 12.61 km.. On an average, 96778 persons are served by each SPO. The Gini's coefficient of concentration ratio or Gi value of 0.838 reveals that, it is highly concentrated only at few bigger size settlements. Therefore, higher lack of this facility is observed among the small size group of settlements, as wide gap between the frequency curves of settlement having SPO and that all inhabited settlements is depicted in Figure 4.3b.

Table 4.5: Percentage Distribution of Settlements by their Size Group of Population Located with Communication Facilities

Malda District

(2001)

Population size group (persons)	All settlements		Per cent settlements by Communication facility			
	No.	%	BPO	SPO	PT	Tel.
< 250	189	11.48	0.37	0	0	2.52
250-499	280	17.01	2.20	0	0	5.04
500-999	360	21.87	10.25	0	0	12.79
1000-1999	354	21.51	17.21	3.85	11.11	23.46
2000-4999	316	19.20	37.00	23.08	33.33	33.91
5000-9999	111	06.74	24.91	34.62	22.22	16.28
>10,000	36	02.19	08.06	38.46	33.33	05.82
Total per cent	-	100.00	100.00	100.00	100.00	100.00
Total number of settlements	1646	-	273	26	09	515
Total number of establishment	-	-	287	34	09	-

Source: *Computed from District Census Hand Book (village directory), 2001, and official records, office of the Superintendent, Malda District Post Office.*

Post and Telegraph Office

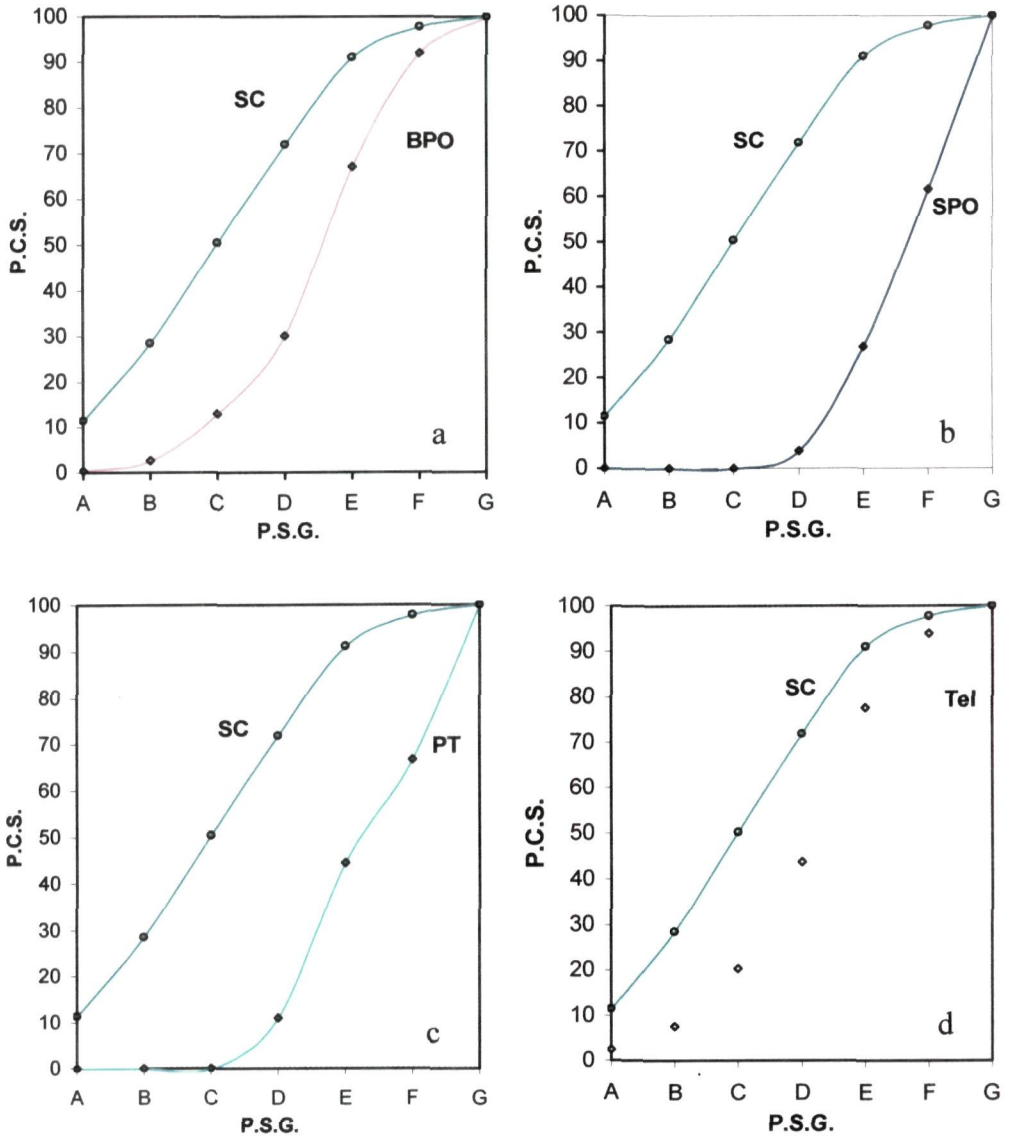
There are only 09 post and telegraph offices (PT) located in 09 different settlements serving communication facility to the average population of 365,607 persons. It is rarely available to the people, as they are disproportionately concentrated at few bigger size settlements which are located at larger average distance with Gi value 0.758 and mean spacing 21.44 km. (Table 4.3).

Telephone

In the district, there are 515 inhabited settlements including five urban centres having telephone (Tel.) facility. It is also exhibited from the Table 4.5 that, though more than 28 per cent of total settlements are having population less than 499 persons in each, only 7.56 per cent are located with telephone facility. Table 4.3 reveals that the settlements having telephone facility is located at the mean spacing of 2.83 km.. 0.354 is the Gini's ratio of coefficient of concentration indicating its approaching uniform distribution among each size group of settlements. Among all the communication facilities, telephone is more uniformly distributed in all size groups of settlements, as both cumulative frequency curves

SPATIAL DISTRIBUTION OF COMMUNICATION FACILITIES MALDA DISTRICT, 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements (Persons); P.C.S. = Per cent Inhabited Settlerments by Size Group
A = <250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.3

(curves of settlements having telephone communication and that of all inhabited settlements) are much closer and corresponds to each other (Fig. 4.3d).

4.2.4 Transportation Facilities

An efficient and optimal spatial organisation of transportation network plays a crucial role in achieving socio-economic development in a region. The transport arteries are more real feature of the geography of an area from the view point of human action than terrain.[3] The movement of mass, goods and services from one place to another is the function of transportation network. For its spatial analysis in the district, fare bus stop, bus station, railway station and pucca (metalled) road have been taken as the basic transportation infrastructure.

Fare Bus Stop

At these places buses are stopped for boarding and delivery of passengers, but don't take rest. In the study area, there are 358 inhabited settlements having fare bus stop (FBS) facility serving an average population of 9,191 persons and located at the mean spacing of 3.40 km.. Gi value of 0.289 explain its approaching uniform concentration among all size group of settlements (Table 4.3) which is clear from the Figure 4.4a wherein besides certain gap both the frequency curves move quite parallel to each other in all size group of settlements.

Table 4.6: Percentage Distribution of Settlements by their Size Group of Population Located with Transportation Facilities

Malda District

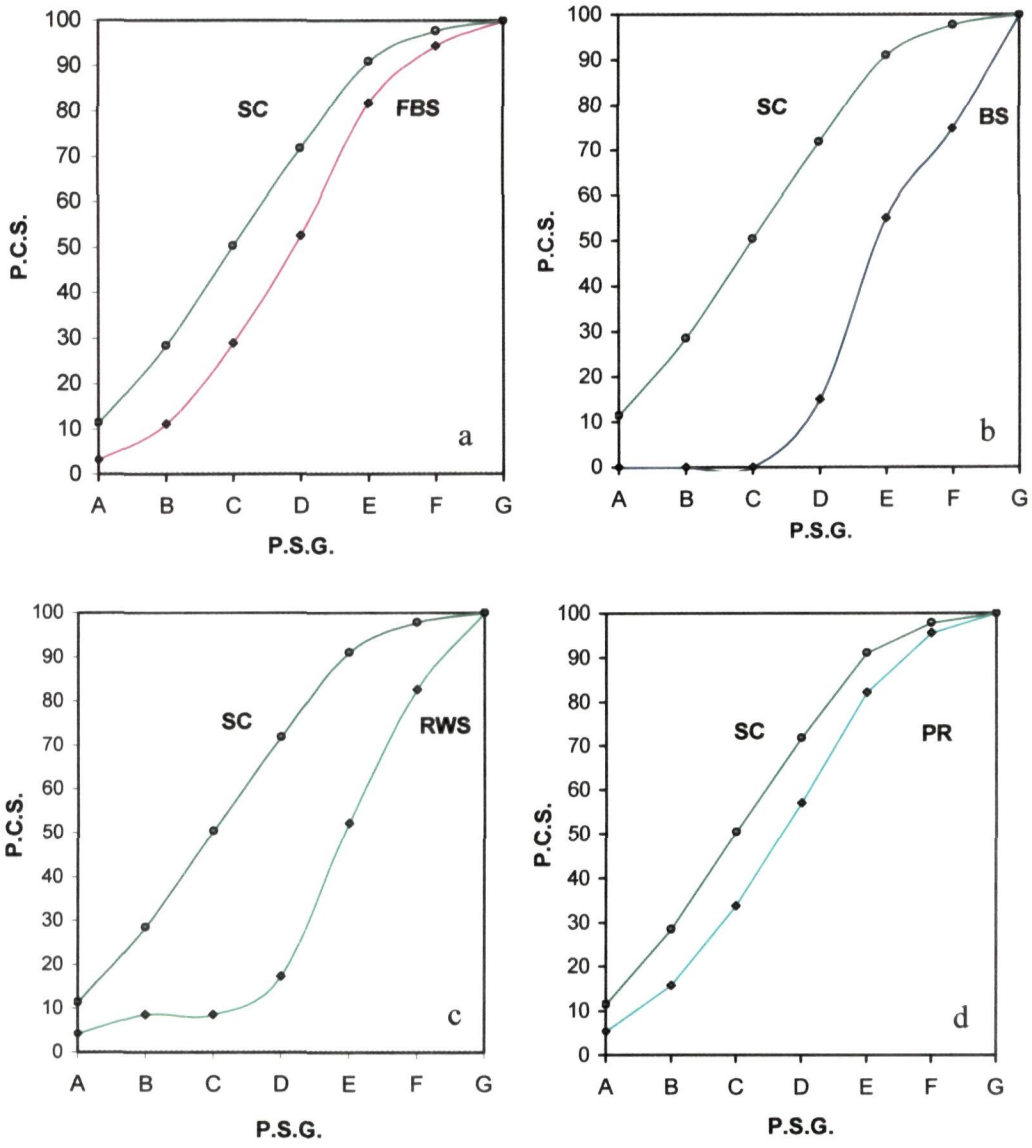
(2001)

Population size group (persons)	All settlements		Per cent settlements by Transportation facility			
	No.	%	FBS	BS	RWS	PR
< 250	189	11.48	3.35	0	4.35	5.42
250-499	280	17.01	7.82	0	4.35	10.47
500-999	360	21.87	17.88	0	0	17.87
1000-1999	354	21.51	23.46	15.0	8.70	23.28
2000-4999	316	19.20	29.33	40.0	34.78	25.09
5000-9999	111	06.74	12.57	20.0	30.43	13.36
>10,000	36	02.19	5.59	25.0	17.39	4.51
Total per cent	-	100.00	100.00	100.00	100.00	100.00
Total number of settlements	1646	-	358	20	23	554
Total number of establishment	-	-	358	20	23	-

Source: Computed from District Census Hand Book (village directory), 2001.

SPATIAL DISTRIBUTION OF TRANSPORTATION FACILITY MALDA DISTRICT, 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements (Persons); P.C.S. = Per cent Inhabited Settlerments by Size Group
A = <250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.4

Bus Station

Bus stations (BS) are the shelter for taking rest for the long journey passengers and tickets are also sold here at the counters for some places at the time of departure of buses. According to Table 4.6, 20 bus stations facilitate an average population of 164,523 in the study area. The settlements having BS are accounted at mean spacing of 14.38 km. and they are highly concentrated at few bigger size settlements (Gi 0.707). Figure 4.4b depicts that both frequency curves (i.e., curves of settlements having bus station and all inhabited settlements) does not correspond to each other revealing the fact of unplanned disproportional distribution of this facility in the size group of settlements.

Railway Station

In the study area, 23 railway stations are located in 23 different inhabited settlements and serves to the average population of 143,064 persons. 13.41 km. is the mean spacing and 0.614 is the Gini's coefficient of concentration ratio of settlements having railway station (Table 4.3). Table4.6 exhibits that the settlements of the size group of population 500 to 999 persons does not possess railway station. Figure 4.4c depicts that the settlements of size group 500 to 999 persons and 1000 to 1999 persons are much deprived of this facility than other size group.

Pucca Road

There are 554 inhabited settlements having pucca (metalled) road facility in the district (Table 4.6), facilitates to average population of 5,939 persons and located at mean spacing of 2.73 km. (Table 4.3). Gi value of 0.224 indicates it's approaching uniform distribution in the size group of settlements. Lower gap as well as more correspondence of both frequency curves (curve of settlements having pucca road and curve of all settlements) depicts quite more uniform distribution among all the transportation facilities in each size group of settlements in the study area (Figure 4.4d).

4.2.5 Market Facilities

The spatial analysis of markets is important in determining the economic landscape of region.[4] Market exist whenever and wherever goods begin to move to consumers in exchange system.[5] Market centres act not merely as the centres for

exchange of goods and services but also act as point of diffusion of innovations and ideas.'[6]

The spatial distribution of market facility has been examined taking three types of markets into consideration i.e., daily market, periodic market and regulated market.

Table 4.7: Percentage Distribution of Settlements by their Size Group of Population Located with Market Facilities
Malda District
(2001)

Population size group (persons)	All settlements		Per cent settlements by Market facility		
	No.	%	DM	PM	RM
< 250	189	11.48	0	1.32	0
250-499	280	17.01	0	2.65	0
500-999	360	21.87	5.33	12.58	0
1000-1999	354	21.51	10.67	21.85	0
2000-4999	316	19.20	30.67	40.40	50.00
5000-9999	111	06.74	28.00	15.89	0
>10,000	36	02.19	25.33	5.31	50.00
Total per cent	-	100.00	100.00	100.00	100.00
Total number of Settlements	1646	-	75	151	02
Total number of establishments	-	-	75	151	02

Source: Computed from District Census Hand Book (village directory), 2001.

Daily Market

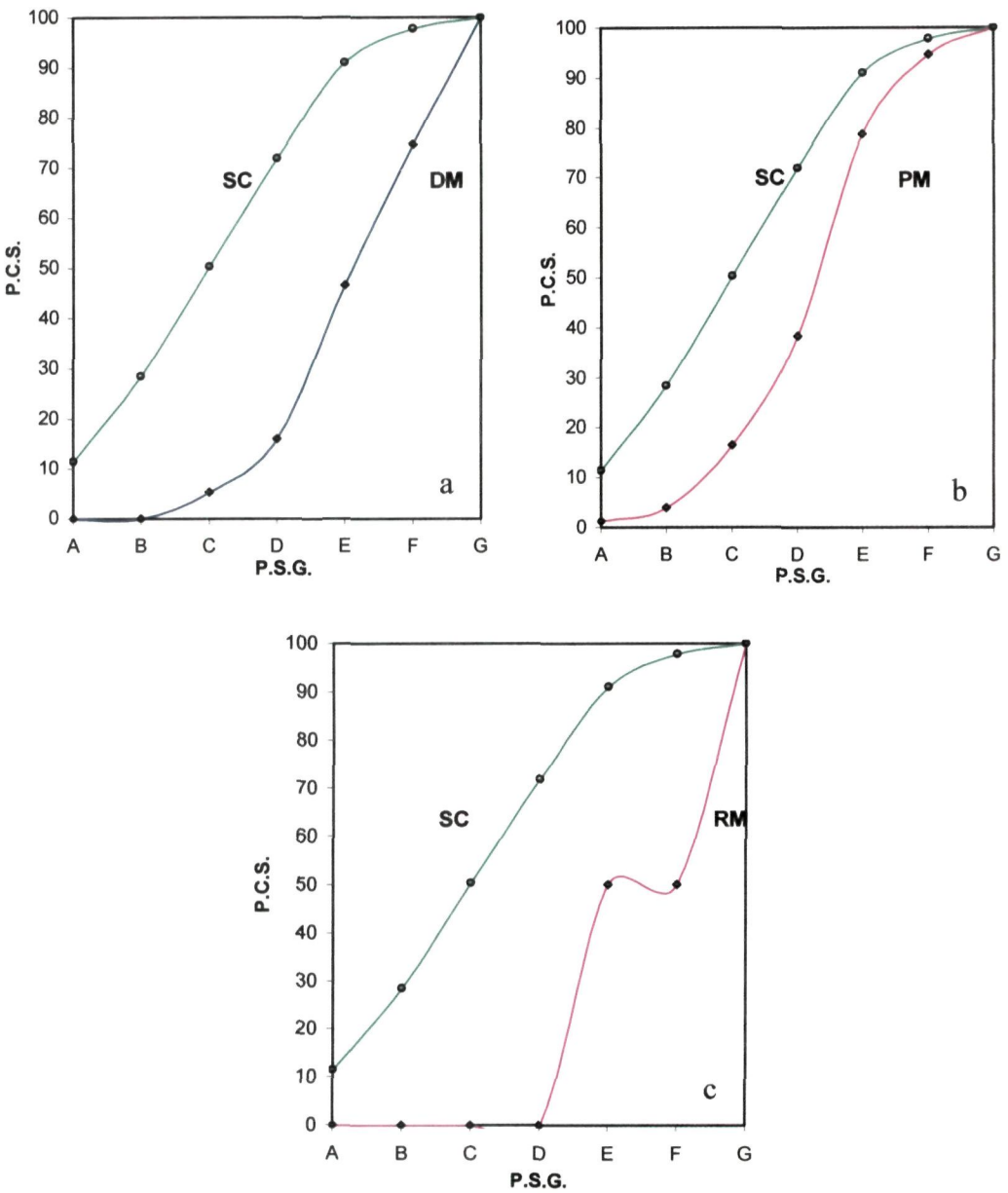
There are 75 daily markets (DM) in 75 different settlements in the district and each one serves an average population of 43,873 persons (Table 4.3). Table 4.7 reveals that no settlement having population below 499 persons possesses it. 7.43 km. is the mean spacing at which the settlements having this facility are located apart from each other. The Gi value of 0.702 reveals higher concentration of daily market at few bigger size settlements. The disproportional concentration is again clear from the Figure 4.5a wherein the frequency curve of settlements having DM does not correspond to the curve of all inhabited settlements among the size group of settlements.

Periodic Market

Table 4.7 shows that the existing 151 periodic markets (PM) are located in 151 different inhabited settlements (one in each settlement) in the district. On an average each periodic market serves to 21,791 persons. The mean spacing of

SPATIAL DISTRIBUTION OF MARKET FACILITY MALDA DISTRICT, 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements (Persons); P.C.S. = Per cent Inhabited Settlerments by Size Group
A = <250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.5

settlements having PM is 5.23 km. and their Gi value is 0.442 (Table 4.3) which infers the fact that it is neither high disproportionately concentrated nor uniformly distributed among the size group of settlements. Figure 4.5b depicts that the smaller size settlements are more lacking this facility than the bigger size settlements.

Regulated Market

Only two regulated markets (RM) are found at Chanchal under CHCL-I Block and Shamsi under Ratua-I Block in the district. A population of 1,645,234 is facilitated by each RM. Settlements having it are located at the mean spacing of 45.48 km., which are bigger in size (in terms of population). The wide gap between both curves (curves of settlements having RM and all inhabited settlements) in each size group of settlements except in the size group 2000-4999 persons, reveals much inadequacy of this facility in the study region (Figure 4.5c).

4.2.6 Electricity and Drinking Water Facilities

Electricity is the basic infrastructure for the socio-economic development of a region. Potable drinking water is the primary need of human beings for better health. Safe drinking water or tap water is seemed to be free from the water born diseases, therefore its availability is significant for social as well as economic development.

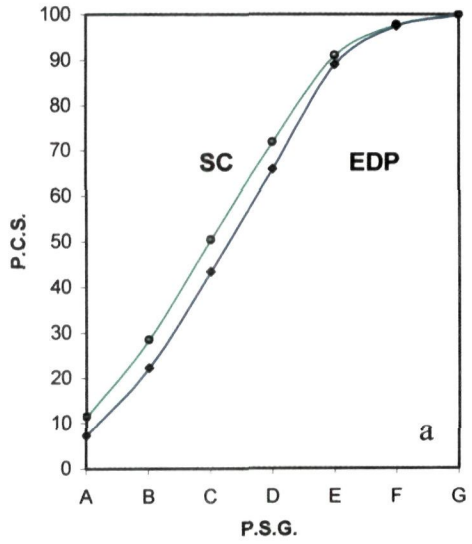
Table 4.8: Percentage Distribution of Settlements by their Size Group of Population Located with Electricity for Domestic Purpose and Drinking Water Facilities
Malda District
(2001)

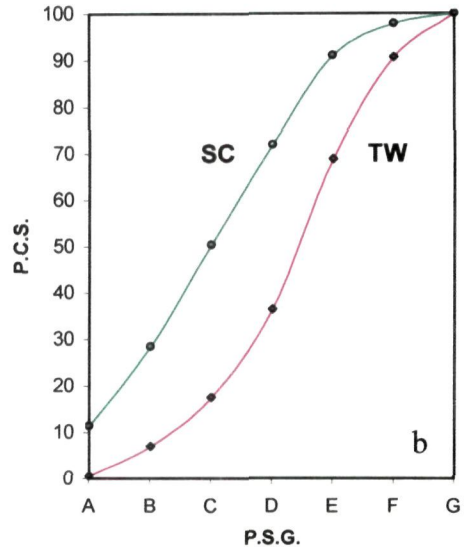
Population size group (persons)	All settlements		Per cent settlements by facility	
	No.	%	EDP	TW
< 250	189	11.48	7.39	0.59
250-499	280	17.01	14.86	6.47
500-999	360	21.87	21.09	10.59
1000-1999	354	21.51	22.57	18.82
2000-4999	316	19.20	23.19	32.35
5000-9999	111	06.74	08.33	21.76
>10,000	36	02.19	02.57	9.42
Total per cent	-	100.00	100.00	100.00
Total number of settlements	1646	-	1285	170

Source: Computed from District Census Hand Book (village directory), 2001.

SPATIAL DISTRIBUTION OF ELECTRICITY AND DRINKING WATER FACILITY, MALDA DISTRICT, 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION





P.S.G. = Population Size Group of Settlements (Persons); P.C.S. = Per cent Inhabited Settlerments by Size Group
A = <250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.6

Electricity for Domestic Purpose

Total 1285 inhabited settlements (more than 78% of total inhabited settlements) have been accounted with electricity for domestic purpose (EDP) and located at the mean spacing of 1.79 km. against 1.58 km. mean spacing of all settlements in the district. Figure 4.6a illustrates that the cumulative frequency curve of settlements having EDP are much corresponding to that of all inhabited settlements indicating near to uniform as well as proportional distribution and better accessibility of this facility in each size group of settlements (Fig.4.6a) in the study area. Gini's concentration ratio of 0.096 again confirms its quite proportional concentration in each size group of settlements (Table 4.3).

Tap Water

There are only 170 settlements (10.33 per cent) having tap water (TW) facility in the district. This facility is unequally distributed at the settlements of size group. Only 17 per cent of the settlements having TW facility are accounted with population less than 999 persons in each, while settlements of this size accounts more than 50 per cent in the study area (Table 4.8). 4.93 km. is the average spacing of settlements having it. It is observed that, though this facility is not highly concentrated only at bigger size settlements (Gi value is 0.465) rather uniform inadequacy exists at each size group of settlements in the district (Fig.4.6b).

4.2.7 Agro-Economic Facilities

Generally speaking, the entire socio-economic development of a region depends on the agricultural development to some extent as agriculture is the backbone of economy in developing countries like India. But agricultural development can not take place until the region has an optimum distribution of agro-economic facilities.[7]

The agro-economic facilities have been analysed in spatial context are, electricity for agriculture, agricultural seed distribution centre, fertilizer distribution centre, cooperative cold store, soil testing centre, agricultural farm and research centre, and agriculture credit society.

Electricity for Agriculture

There are 606 settlements (37%) having electric facility for agriculture (EA) in the district. Table 4.9 reveals that, 32.51 per cent of the settlements having EA facility are accounted in the size group 2000 to 4999 persons, however 19.20 per cent of total inhabited settlements are accounted in this group. Settlements having it are located at mean spacing of 02.61 km. and Gini's ratio of 0.248 reveals approaching uniform distribution (Table 4.3). Among all the agro-economic facilities, electricity for agriculture is more equally distributed in each size group of settlements. Figure 4.7a depicts that the frequency curve of settlements having EA is quite closer and corresponding to that of all inhabited settlements indicating its somewhat proportional distribution in each size group of settlements. However, narrow gap between the curves in small size group of settlements reveals quite lack of it.

Table 4.9: Percentage Distribution of Settlements by their Size Group of Population Located with Agro-Economic Facilities

Malda District

(2001)

Population size group (persons)	All settlements		Per cent settlements by Agro- Economic facility						
	No.	%	EA	ASDC	FDC	CCS	STC	AFRC	ACS
< 250	189	11.48	3.63	0	0.37	0	0	0	1.27
250-499	280	17.01	8.42	0	3.70	0	0	0	4.46
500-999	360	21.87	17.49	2.04	7.41	0	0	0	7.64
1000-1999	354	21.51	26.40	8.16	17.41	50.0	0	11.11	21.66
2000-4999	316	19.20	32.51	34.69	41.11	0	0	33.33	39.49
5000-9999	111	06.74	9.41	22.46	18.89	50.0	0	0	18.47
>10,000	36	02.19	2.14	32.65	11.11	0	100.0	55.56	7.01
Total percent	-	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total number of settlements	1646	-	606	49	270	02	01	09	157
Total number of Establishments	-	-	-	81	1068	02	01	10	161

Source: Computed from District Census Hand Book (Village directory), 2001, and official records of District Agriculture Department, Malda district.

Agricultural Seed Distribution Centre

There are 81 agricultural seed distribution centres (ASDC) distributed among 49 settlements (Table 4.9) and each one provides facility to the average population of 40,623 persons (Table 4.3). 9.19 km. is the mean spacing at which

the settlements having ASDC are located apart from each other, while Gini's ratio of 0.751 reveals that it is highly disproportionately concentrated at few bigger in size settlements (Table 4.3). Table 4.9 reveals that 55 per cent of the settlements having ASDC are bigger size with population more than 5000 persons in each, however 8.93 per cent of total inhabited settlements are accounted with this size. Figure 4.7b depicts uneven distribution of ASDC in the size group of settlements as the curve of settlements having it does not correspond to the curve of all settlements in the district.

Fertilizer Distribution Centre

Total 1068 fertilizer distribution centres (FDC) are distributed among 270 settlements in the district (Table 4.9). On an average 3081 person population are served by each FDC. 3.91 km. is the mean spacing of settlements having it. The Gi value of 0.533 reveals its moderate concentration in the size group of settlements (Table 4.3). Besides, Figure 4.7c depicts that small size of settlements are lacking this facility as a deviation is observed between the curve of settlements having FDC and all inhabited settlement in small size group of settlements.

Cooperative Cold Store

There are only two cooperative cold stores (one unit in Samsi of Ratua-I block and rest one in Aklakhi of GZL block) in the district (Table 4.9). The mean spacing of settlements having it is accounted at 45.48 km. while their Gi value is 0.556.

Soil Testing Centre

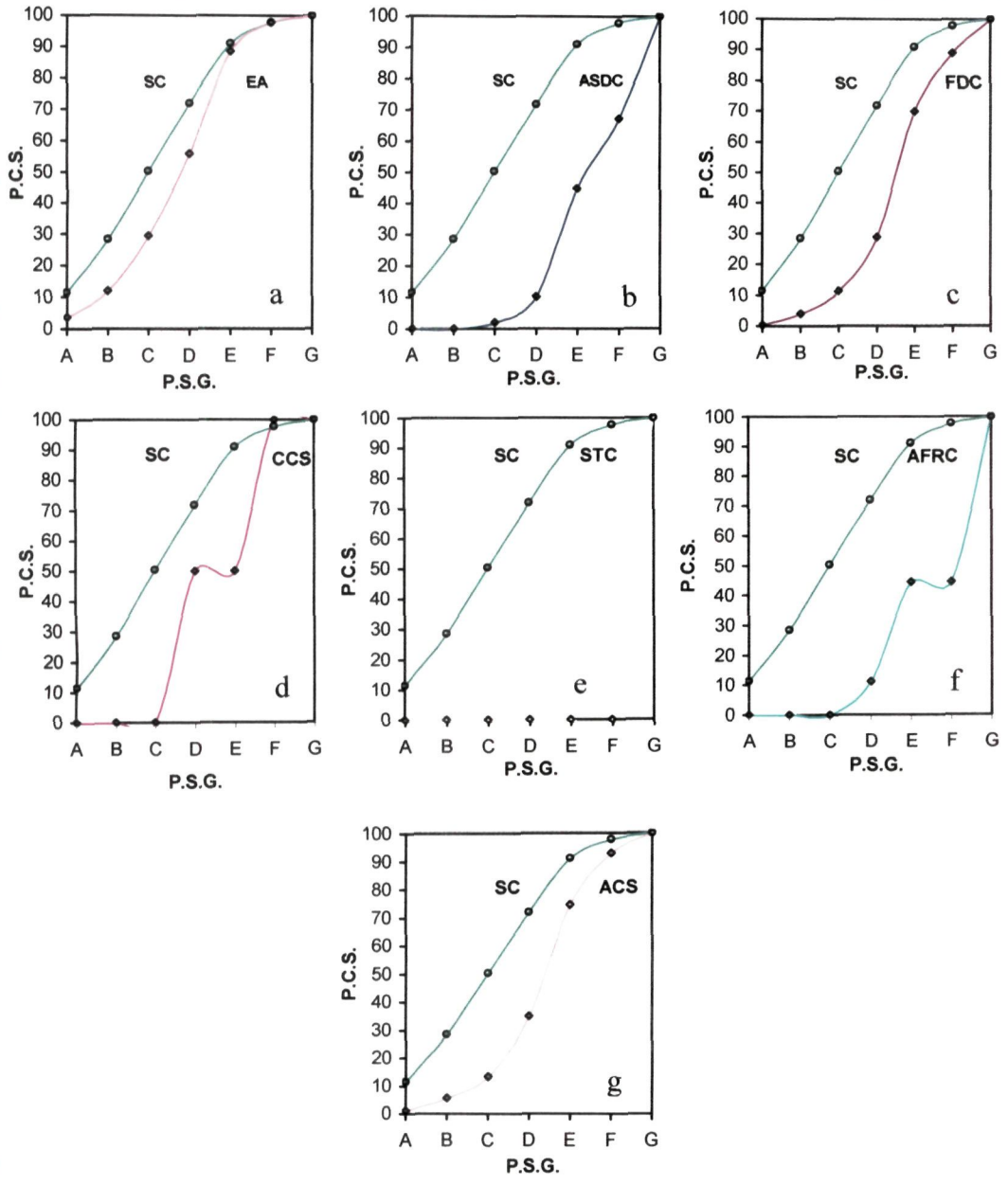
Only one unit serves the need of soil testing in the study area. It is located in English Bazar (district head quarter).

Agricultural Farm and Research Centre

In the study area, there are 10 agricultural farm and research centres (AFRC) distributed among 09 settlements. But neither settlements with population less than 999 persons nor settlements of the size group 5000-9999 persons do possess it (Table 4.9). Table 4.3 reveals that, average population of 329,047 persons is served by each unit of AFRC and settlements having it are located at the mean spacing of 21.44 km.. 0.778 is the Gini's ratio reveals that it is highly

SPATIAL DISTRIBUTION OF AGRO-ECONOMIC FACILITIES
MALDA DISTRICT, 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements; P.C.S. = Per cent Inhabited Settlements by Population Size Group
A = < 250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.7

disproportionately concentrated at few big sizes of settlements. Figure 4.7f depicts that the frequency curve of settlements having agricultural farm and research centre does not correspond to that of all settlements express it's unequal accessibility to the size group of settlements.

Agricultural Credit Society

Agricultural Credit Society (ACS) provides financial opportunity to the farmers for initial expenditure in agriculture. There are 161 such societies distributed among 157 settlements (Table 4.9) and provides facility to the average population of 20,438 persons. Table 4.3 reveals that, settlements having ACS are located at the mean spacing of 05.13 km.. Gini's ratio of 0.478 reveals that, it is neither highly disproportionately nor uniformly concentrated in the size group of settlements, but small size settlements are somewhat lacking (Fig. 4.7g).

4.2.8 Financial Facilities

Easy accessibility of financial and commercial facility to the inhabitants is one of the significant determinants of socio-economic development in a region. For their spatial analysis two types of banks i.e., commercial bank and cooperative commercial bank have been taken under consideration.

Table 4.10: Percentage Distribution of Settlements by their Size Group of Population located with Financial Facilities

Malda District

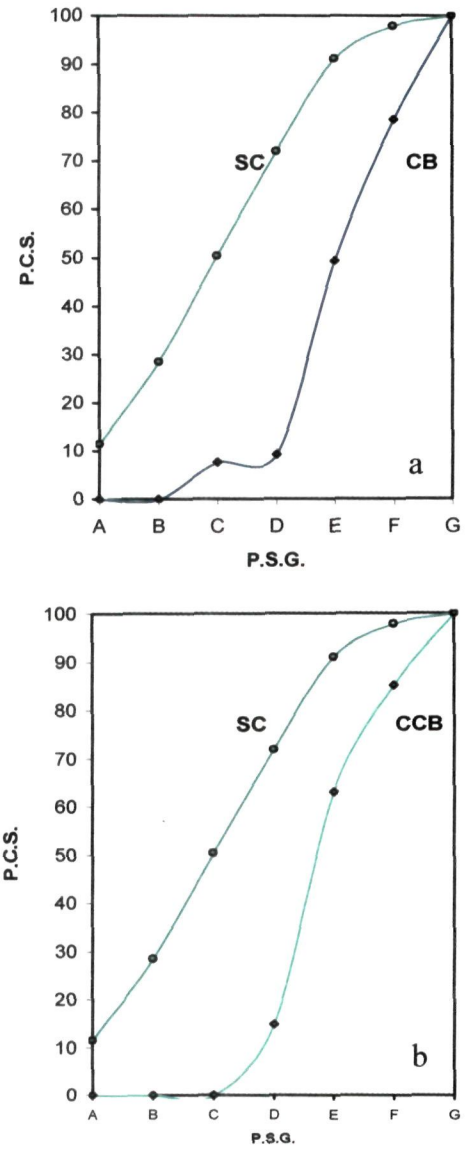
(2001)

Population size group (persons)	All settlements		Per cent settlements by Financial facility	
	No.	%	CB	CCB
< 250	189	11.48	0	0
250-499	280	17.01	0	0
500-999	360	21.87	7.69	0
1000-1999	354	21.51	1.54	14.82
2000-4999	316	19.20	40.0	48.15
5000-9999	111	06.74	29.23	22.22
>10,000	36	02.19	21.54	14.81
Total per cent	-	100.00	100.00	100.00
Total number of settlements	1646	-	65	27
Total number of establishments	-	-	80	35

Source: Computed from District Census Hand Book (village directory), 2001

SPATIAL DISTRIBUTION OF FINANCIAL FACILITIES, MALDA DISTRICT 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements; P.C.S. = Per cent Inhabited Settlements by Population Size Group
A = < 250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.8

Commercial Bank

Table 4.10 exhibits that, total 80 commercial banks (CB) are distributed among 65 settlements and serves to 41,131 person average population in the study area (Table 4.3). 07.98 km. is the mean spacing at which the settlements having it are located apart from each other. Gini's concentration ratio of 0.709 express that it is disproportionately concentrated at few bigger size settlements. The unequal disproportional pattern is depicted from Figure 4.8a wherein the frequency curve of settlements having commercial bank is not parallel to that of all settlements in the size group of settlements.

Cooperative Commercial Bank

There are 35 cooperative commercial banks (CCB) distributed among 27 settlements, but no one is found in the settlement having population less than 999 persons (Table 4.10). 48.15 per cent of settlements having CCB are accounted in the size group of population ranging 2000 to 4999 persons, while this size group records 19.20 per cent of all inhabited settlements in the district. Table 4.3 reveals that on an average 94,013 persons population are facilitated by each CCB in the study area. The settlements having it are located at far of distance i.e., 12.38 km. (mean spacing) from each other. However, their distribution is unequal and disproportional (Gi value 0.678) in the size group of settlements. Figure 4.8b depicts that due to unequal distribution the small size groups of settlements are lack of it.

4.2.9 Veterinary Services

Veterinary service facility plays an important role in rural economy, as cattle's rearing is one of the sources of income here. State animal health centre, block animal health centre and additional block animal health centre have taken into account for it spatial analysis in the district.

State Animal Health Centre

The numeral distribution shows that there are only 04 settlements (viz, Harishchandrapur in HC Pur-I block, Singia in CHCL-I block, Gazole in Gazole block and English Bazar in ENGB block) having State Animal Health Centre (SAHC) one in each in the study area. An average population of 822,617 persons is served by each SAHC unit. 32.16 km. is the mean spacing of settlements having

SAHC, therefore it is poorly accessible to the mass. Besides, it is disproportionately concentrated among the size group of settlements (i.e., Gi value 0.641). Small size group of settlements having population less than 1999 persons does not possess this facility. Higher deviation of frequency curve of settlements located with SAHC from that of all settlement shows its higher inaccessibility among the smaller size settlements than the bigger size (Fig. 4.9a).

Table 4.11: Percentage Distribution of Settlements by their Size Group of Population Located with Veterinary Service Facilities

Malda District

(2001)

Population size group (persons)	All settlements		Per cent settlements by Veterinary facility		
	No.	%	SAHC	BAHC	ABHC
< 250	189	11.48	0	0	0
250-499	280	17.01	0	0	0
500-999	360	21.87	0	0	18.75
1000-1999	354	21.51	0	13.33	12.5
2000-4999	316	19.20	25.0	33.33	37.5
5000-9999	111	06.74	0	20.00	25.0
>10,000	36	02.19	75.0	33.34	06.25
Total percent	-	100.00	100.00	100.00	100.00
Total number of settlements	1646	-	04	15	16
Total number of establishments	-	-	04	15	16

Source: Computed from Official Records, Office of the Deputy Director, Animal Resource Development, Malda, 2001.

Block Animal Health Centre

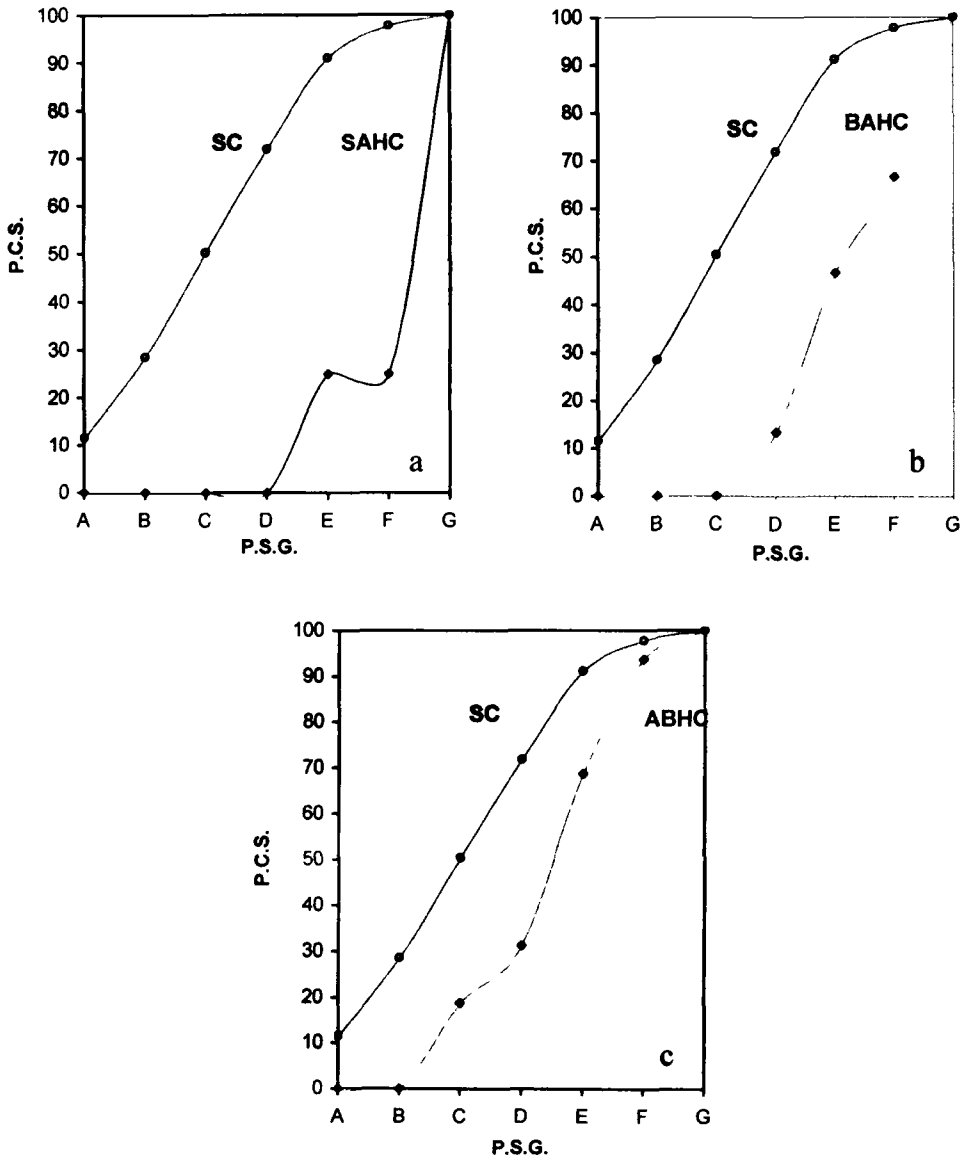
In the district, total 15 Block Animal Health Centre (BAHC) are accounted in 15 settlements (one settlement of each block). Each one serves to the average population of 219,364 persons (Table 4.3). Table 4.3 reveals that the settlements having it are located at the mean spacing of 16.61 km.. The facility is highly disproportionately concentrated at bigger size settlements (Gi value 0.748).

Additional Block Animal Health Centre

Table 4.11 exhibits that total 16 Additional Block Animal Health Centres (ABHC) are distributed among 16 different settlements and serves to the average population of 205,654 persons (Table 4.3). Among the veterinary services, it records better accessibility as the settlements having ABHC are located at the

SPATIAL DISTRIBUTION OF VETERINARY FACILITIES, MALDA DISTRICT 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P S G = Population Size Group of Settlements, P C S = Per cent Inhabited Settlements by Population Size Group
A = < 250, B = 250-499, C = 500-999, D = 1000-1999, E = 2000-4999, F = 5000-9999, G = >10000

Fig. 4.9

mean spacing of 16.08 km.. While Gi value of 0.507 reveals that it is neither too disproportionately concentrated nor uniformly among the size group of settlements. Figure 4.9c depicts somewhat uniform gap between both frequency curves (curves of settlements having ABHC and all inhabited settlements) at each size group of settlements indicating its quite proportional distribution in the size group of settlements.

4.2.10 Administrative Facilities

Good administrative set up is prerequisite for proper socio-economic development in a region. Small size of region is important to create an efficient administrative order and to provide developmental pursuits within the administrative boundary. For the present analysis four administrative units have been considered, i.e. block head quarter, police station, sub-division and district head quarter.

Block Head Quarter

In the district there are 15 blocks each having its head quarter. No settlements with the population less than 999 persons are having Block Head Quarter (BHQ). Among them only English Bazar and Old Malda are urban centres while rests are rural. 16.61 km. is the mean spacing of settlements having BHQ.

Table 4.12: Percentage Distribution of Settlements by their Size Group of Population Located with Administrative Facilities

Malda District

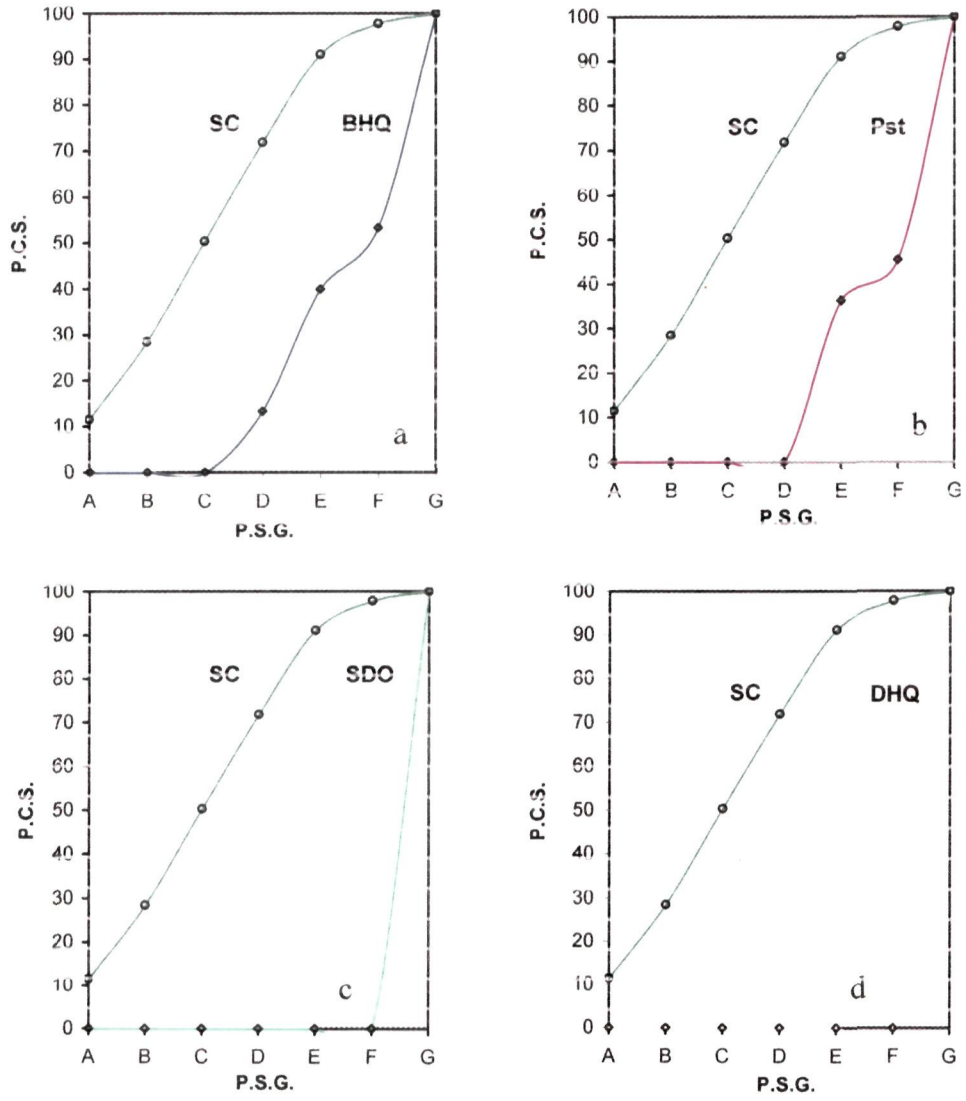
(2001)

Population size group (persons)	All settlements		Per cent settlements by Administrative facility			
	No.	%	BHQ	PSt.	SDO	DHQ
< 250	189	11.48	0	0	0	0
250-499	280	17.01	0	0	0	0
500-999	360	21.87	0	0	0	0
1000-1999	354	21.51	13.33	0	0	0
2000-4999	316	19.20	26.67	36.36	0	0
5000-9999	111	06.74	13.33	9.09	0	0
>10,000	36	02.19	46.67	54.55	100.00	100.00
Total per cent	-	100.00	100.00	100.00	100.00	100.00
Total number of settlements	1646	-	15	11	02	01
Total number of establishment	-	-	15	11	02	01

Source: Computed from Official Records, District Census Office (Administrative Building), Malda, 2001.

SPATIAL DISTRIBUTION OF ADMINISTRATIVE FACILITIES MALDA DISTRICT, 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements; P.C.S. = Per cent Inhabited Settlements by Population Size Group
A = < 250: B = 250-499: C = 500-999: D = 1000-1999: E = 2000-4999: F = 5000-9999: G = >10000

Fig. 4.10

Police Station

There are 11 police stations (PSt.) in the district located in 11 different settlements (Table 4.12). No settlement with population less than 1999 possesses PSt.. The mean spacing and Gini's ratio of concentration accounted for 19.39 km. and 0.843 respectively.

Sub Divisional Office

There are two sub divisional offices (SDO) in the district, one in English Bazar and another in Singia (CHCL-I block), but only English Bazar is urban centre while Singia is rural. Both the settlements having SDO are located at the mean spacing of 45.48 km.

District Head Quarter

English Bazar (or Malda town) possess the location of district head quarter (DHQ). It caters administrative needs to the total population of district i.e., 3,290,468 persons and all lower administrative units i.e., BHQ, Pst. & SDO comes under.

4.2.11 Recreation Facilities

Recreation facilities are important for the refreshment as well as entertainment of human beings. Four types of recreation facilities i.e., park, public library, free reading room and cinema talkies have been considered for the analysis.

Park

Table 4.13 reveals that, three recreational parks are distributed among two settlements. English Bazar (Malda town) alone possessing two parks and rest one is located in old Malda block.

Public Library

In the district, 105 public libraries (PL) are distributed among 100 different inhabited settlements (Table 4.13) and cater its facility to 31,388 persons (Table 4.3). Same table (Table 4.3) shows that the mean spacing of settlements having it recorded at 06.43 km. and Gi value of 0.616 reveals its disproportional concentration at bigger size settlements. Figure 4.11b depicts that smaller size settlements are lacking it.

Table 4.13: Percentage Distribution of Settlements by their Size Group of Population located with Recreational Facilities

Malda District

(2001)

Population size group (persons)	All settlements		Per cent settlements by Recreational facility			
	No.	%	Prk.	PL	FRR	Cin.
< 250	189	11.48	0	0	0	0
250-499	280	17.01	0	03.0	03.0	0
500-999	360	21.87	0	08.0	08.0	0
1000-1999	354	21.51	0	08.0	08.0	8.0
2000-4999	316	19.20	0	39.0	39.0	28.0
5000-9999	111	06.74	50.0	26.0	26.0	32.0
>10,000	36	02.19	50.0	16.0	16.0	32.0
Total per cent	-	100.00	100.00	100.00	100.00	100.00
Total number of settlements	1646	-	02	100	100	25
Total number of establishments	-	-	03	105	104	33

Source: Computed from District Census Hand Book (Village directory), Malda, 2001, Official Records, District Library, Malda, 2001.

Free Reading Room

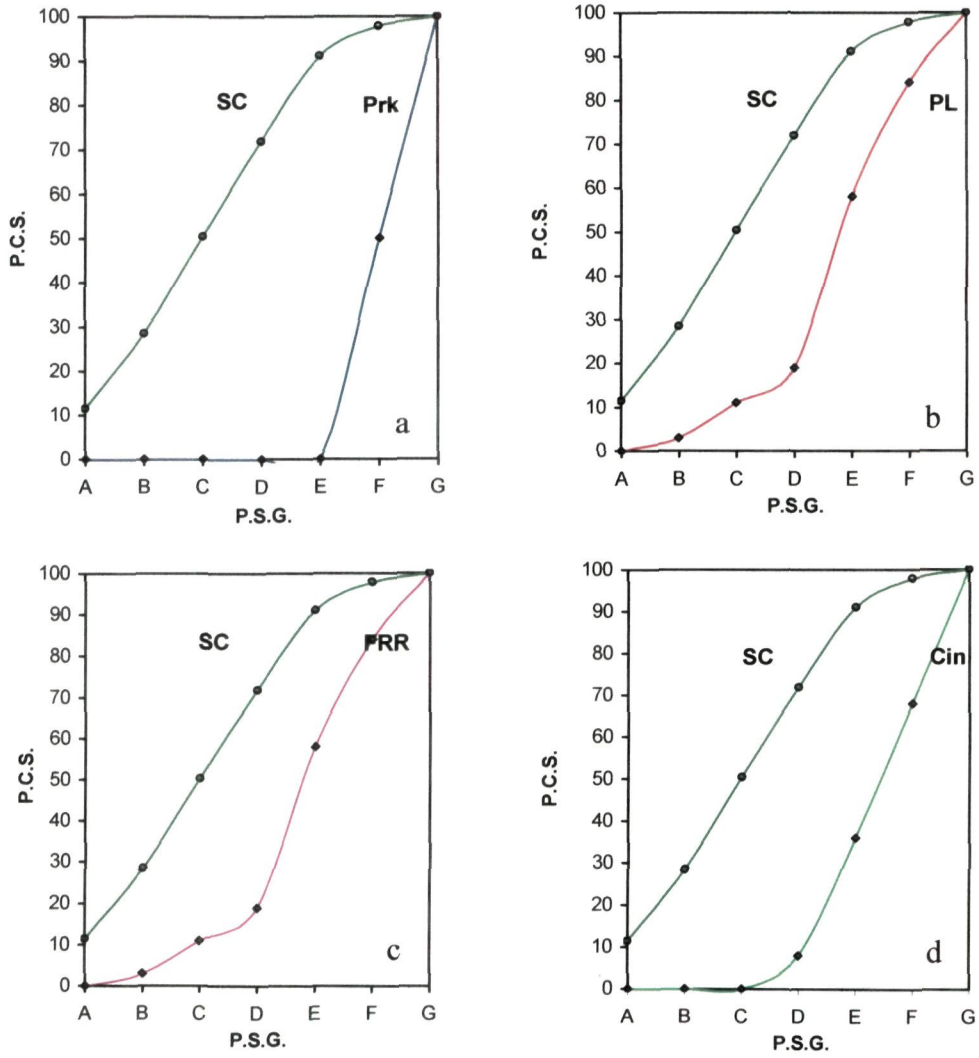
Table 4.13 exhibits that 104 Free Reading Rooms (FRR) are distributed among 100 inhabited settlements located at the mean spacing of 06.43 km.. Their concentration is somewhat disproportional in the size group of settlements (Gi value 0.616). On an average 31,639 persons are facilitated by each FRR in the district. Figure 4.11c depicts that small size settlements are much lacking this facility than the bigger size.

Cinema Talkies

The numeral distribution shows that there are 33 cinema talkies (Cin.) are accounted in 25 inhabited settlements (Table 4.13) and provides facilities to 99,711 persons average population in the district. They are widely spaced and disproportionately concentrated at bigger size settlements as the mean spacing of settlements is 12.86 km and Gini's ratio of 0.791 (Table 4.3). Deviation of frequency curves of settlements having cinema talkies and that of all inhabited settlements reveals their unequal distribution among the size group of settlements and inaccessibility at the smaller size (Fig.4.11d).

SPATIAL DISTRIBUTION OF RECREATIONAL FACILITIES MALDA DISTRICT, 2001

CUMULATIVE FREQUENCY CURVES OF ALL SETTLEMENTS AND SETTLEMENTS LOCATED WITH FUNCTION



P.S.G. = Population Size Group of Settlements; P.C.S. = Per cent Inhabited Settlements by Population Size Group
A = < 250; B = 250-499; C = 500-999; D = 1000-1999; E = 2000-4999; F = 5000-9999; G = >10000

Fig. 4.11

The foregoing analysis of spatial distribution of socio-economic facilities reveals that the nature of distribution is not uniform. Among all the facilities under study, Electricity for Domestic Purpose (EDP) records highest accessibility. The settlements having EDP are more closely located i.e., 1.79 km. is their mean spacing The Gini's ratio of coefficient of concentration of 0.096 reveals that this facility is approaching uniformly distributed among each size group of settlements. However, both the techniques i.e., Mean Spacing and Gini's Coefficient Concentration clearly reveals that Soil Testing Centre facility (STC) is mainly concentrated at single settlement and is inaccessible to the people. Besides, facilities of District Head Quarter (DHQ) and Sub-Divisional Office (SDO) also record highest concentration ratio (i.e., 0.978) but these are administrative facilities and have complete control over the defined boundary.

It is observed from graphical analysis that, higher gap between the frequency curves (curves of settlements having facility and all inhabited settlements) is observed among the small size group of settlements. However, the gap subject to decreases with the increasing size of settlements. It is clear that, higher lack of facility is observed among the smaller size settlements. It further reveals that, as the order of facilities is increasing among the size of settlements the gap is subject to decrease and increase with the increasing and decreasing size of settlements respectively.

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CHAPTER - 5

REGIONAL DISPARITIES IN THE LEVELS OF SOCIO-ECONOMIC DEVELOPMENT

REGIONAL DISPARITIES IN THE LEVELS OF SOCIO-ECONOMIC DEVELOPMENT

The process of socio-economic development involves a significant change which is manifested on physical landscape in a geographical dimension. The planning for socio-economic development involves policies and programme for the location of amenities and facilities. But in real sense the facilities are seldom allocated according to proper plan in an organized manner. But owing to the presence of physico-cultural and socio-economic diversities as well as political one, the socio-economic facilities are distributed unequally leading to differential levels of development across the regions. Such unchecked and uncontrolled process of growth leads to regional disparities.[1] Therefore it fails to extend its fruits of benefits equally to every parts of the region rather widens the gap of existing disparities and inequalities among the people.

The basic cause of regional disparities is the states' lack of an inherent mechanism to ensure that, in the long run, the benefits of economic change are distributed equally, on a per capita basis. Regional differences are to a large extent built in due to large unequal natural endowments and lack of infrastructure facilities which form the basis for rapid economic growth.[2] Broadly, three factors i.e., historical. natural and man-made are attributed to the problems of regional disparities. The regions rich in natural resources – fertile soil, water, minerals etc. enjoy better advantages to be developed. Besides, social, political and economic factors are also responsible for creating regional disparities in the nation.

Regional disparities in socio-economic development are a common phenomenon in both developed and developing countries. But it differs in certain degree. In India, glaring disparities in the socio-economic and cultural development are found at inter and intra region both. Although the Government has made much more efforts to reduce the regional disparities yet the present trend of economic development has not yielded positive result in this direction, instead it has created wide gap at every level of administrative regions.[3] It is attributed to lack of proper planning development. The basic problems lie in our National planning because before its implementation it did not assess the nature of the problems and productive potential resources of the region at micro level. It was Forth Five Year

Plan (1969-74) which marked for the initiation of decentralization of National planning by introducing the district level plan. Further district level plan was decentralized at block level plan during the Sixth Five Year Plan (1980-85).[4] Thus, the decentralized planning policy procedure was adopted to prepare village plans by collecting village requirements at block levels and finally they were put together at district level for district plans. But such attempts were confined only on paper.[5] Though the theoretical planning was very effective and fruitful yet it was not translated on the ground to minimize the existing gap of regional disparities in the country.

Malda district- study area is an integral part of the country, where neither such attempt in evaluating the local resource availability was made nor was people's demands collected at village level. Therefore in the district, planning at grass root level has not been formulated from the Government side nor was any scholarly work regarding the present position of regional disparities at micro-level done previously. Subsequently, Malda district records a dire socio-economic and cultural disparity at block level, gram panchayat level as well as village level.

The present section of research is an attempt to examine the levels of socio-economic development at block level to highlight the existing disparities within the district. The levels of development have been analysed based on existing socio-economic amenities and facilities.

Due to lack of official records regarding all the parameters of socio-economic development for the year 1991, the disparities in the levels of socio-economic development has been worked out in spatial context for the year 2001.

The levels of socio-economic development at block level have been examined on the basis of Z-score method. In this method, raw data of each variable has been standardized. The model is thus;

$$Zi = \frac{Xi - \overline{X}}{\delta}$$

Where, Zi is the standard score or Z-score of ith variable,

Xi is the individual observation,

$\overline{X}$ is the mean of variable, and δ denotes standard deviation.

On the basis of composite mean Z-score (CS) of all the variables of respective category, the indices of development of each block has been computed and are grouped into three levels of development i.e., high, medium and low. The model of Composite Mean Z-score is thus,

$$C.S. = \frac{\sum Zij}{N}$$

Where, C.S. refers to the Composite Mean Z-score,
Zij is Z-score of an indicator j in block i, and
N is the number of variables.

Disparities in the levels of development have been analysed for each group of socio-economy i.e., education, health, communication and transportation, market, electricity and drinking water, agro-economy, finance and veterinary and recreation separately and then the composite mean Z-score of all the 41 indicators has been computed to find out the overall index of socio-economic development of each block (Table 5.2). The Z-score of each variable are given in Table 5.1.

All the 41 indicators (except the indicators of administrative facility mentioned in chapter-4) have been transferred into absolute unit of measurement, instead of simple number of services and functions. For example, number of primary school per 10,000 population, number of settlements with telephone facility per 100 settlements, number of bus station per 100 sq. km. area and number of agricultural credit society per 1,000 hectare of Net Cropped Area (NCA).

5.1 LEVELS OF EDUCATIONAL DEVELOPMENT

Regional disparities in the levels of educational development has been measured on the basis of six variables identifying with symbolic nomenclature i.e., number of primary school per 10,000 persons (X_1), number of middle school per 10,000 persons (X_2), number of secondary school per 10,000 persons (X_3), number of higher secondary school per 10,000 persons (X_4), number of college per 10,000 persons (X_5) and number of professional training institute per 10,000 persons (X_6).

It is observed in the Table 5.2 and Figure 5.1 that, there exist wide regional disparities in educational development in the district. Table 5.2 reveals that, highest composite mean Z-score i.e., 1.38 of educational development is scored by

Table 5.1: Z-Score of Socio-Economic Variables

Malda District

(2001)

Sl. No.	Block	Education						Health					
		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
1.	HC Pur-I	0.40	0.09	0	0.71	-0.85	-0.25	-0.85	0.79	-0.40	-0.10	1.06	-0.35
2.	HCPur-II	-0.81	-0.39	-1.07	-0.54	-0.85	-0.25	-1.14	-0.09	-0.40	-1.01	-0.87	-0.35
3.	CHCL-I	-0.27	0.43	-0.65	0.04	1.37	-0.25	1.17	0.50	-0.40	2.86	1.06	-0.35
4.	CHCL-II	-0.95	0.84	-0.06	-1.37	-0.85	-0.25	1.08	0.79	-0.40	-0.80	-0.87	-0.35
5.	Ratua-I	-0.65	-0.66	-0.48	-0.21	1.0	-0.25	-0.63	2.26	-0.40	-0.60	-0.87	-0.35
6.	Ratua-II	-0.53	1.05	0.42	-0.21	-0.85	-0.25	-1.14	1.09	-0.40	-1.11	-0.87	-0.35
7.	GZL	0.52	1.53	1.43	-0.21	-0.85	-0.25	1.68	-0.68	-0.40	-0.62	0.09	-0.05
8.	BMNL	1.81	2.01	1.07	-1.37	2.11	-0.25	2.13	0.20	0.12	0.66	1.71	-0.35
9.	HB Pur	1.68	-0.80	1.96	0.37	-0.85	-0.25	0.32	0.20	-0.40	-0.73	0.74	-0.35
10.	OLM	0.61	-1.69	-2.20	-0.54	1.0	-0.25	-0.41	-0.09	1.53	0.77	-0.87	0.15
11.	ENGB	0.08	-0.12	0.42	3.13	1.0	3.75	-0.41	-2.15	3.28	0.62	1.71	3.71
12.	MNK	0.95	-0.87	0.42	0.21	-0.85	-0.25	-0.47	-0.38	-0.40	-0.39	0.74	-0.35
13.	KLK-I	-0.83	-1.35	-0.24	-0.04	0.26	-0.25	-0.16	-0.67	-0.40	0.86	-0.87	-0.05
14.	KLK-II	0.09	0.16	-0.12	-0.21	-0.85	-0.25	-0.45	-0.38	-0.40	0.14	-0.87	-0.35
15.	KLK-III	-1.34	-0.18	-0.89	-0.21	0.26	-0.25	-0.69	-1.26	-0.40	-0.54	-0.87	-0.35

(Contd..)

(Contd. Table 5.1)

Sl. No.	Block	Communication and Transportation								Market, Electricity and Drinking Water				
		X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	X_{25}
1.	HC Pur-I	-0.19	0.67	0.64	-0.76	0.61	1.83	0.5	-0.92	-0.19	0.68	-0.37	-0.34	-0.21
2.	HCPur-II	0.82	-1.33	-0.78	0.52	-1.51	-1.07	1.36	-0.30	-0.92	0.06	-0.37	0.06	-0.59
3.	CHCL-I	0.67	0.50	0.64	0.09	0.32	0.96	-1.0	-1.0	1.72	1.58	2.79	0.94	-0.84
4.	CHCL-II	0.06	-1.33	-0.78	-0.24	-0.43	-1.07	-0.37	-0.77	-0.53	0.35	-0.37	0.61	-0.21
5.	Ratua-I	-0.59	0.17	2.55	-0.76	0.28	0.38	0.14	0.01	-0.41	-0.42	2.26	0.67	0.91
6.	Ratua-II	1.13	-0.33	-0.78	2.14	1.63	-1.07	1.52	1.17	-1.20	-0.09	-0.37	1.08	0.54
7.	GZL	1.48	-0.83	-0.07	-0.28	-0.04	-0.76	-0.50	-1.70	-0.41	0.01	-0.37	-1.08	-0.84
8.	BMNL	0.62	0	-0.78	-1.29	2.05	0.53	-1.0	-0.38	-0.75	2.25	-0.37	-0.47	-0.59
9.	HB Pur	0.87	0.50	-0.78	-1.24	0.09	0.19	-0.36	-0.38	-0.92	0.68	-0.37	-0.07	-0.84
10.	OLM	-1.95	0.33	-0.78	-1.09	-0.13	-1.07	0.10	0.78	0.26	-1.12	-0.37	0.20	-1.21
11.	ENGB	-2.05	3.0	0.40	0.19	0.41	-0.44	-0.04	2.33	1.10	-1.12	-0.37	0.54	0.29
12.	MNK	0.42	0.17	1.36	1.48	-1.56	-0.54	-1.0	0.55	-0.13	0.30	-0.37	-0.13	-0.34
13.	KLK-I	-0.14	-0.33	-0.78	0.67	-0.04	2.04	2.60	0.78	0.09	-0.97	-0.37	0.89	1.04
14.	KLK-II	-0.69	-0.50	-0.78	1.48	-0.11	2.17	-1.0	0.63	2.50	-1.38	-0.37	0.47	2.61
15.	KLK-III	-0.44	-0.67	0.88	-0.52	-1.58	1.23	-0.5	-0.77	-0.19	-0.84	-0.37	-3.04	-0.09

(*Contd..*)

(Contd. Table 5.1)

Sl. No.	Block	Agro-Economy							Finance and Veterinary					Recreation			
		X_{26}	X_{27}	X_{28}	X_{29}	X_{30}	X_{31}	X_{32}	X_{33}	X_{34}	X_{35}	X_{36}	X_{37}	X_{38}	X_{39}	X_{40}	X_{41}
1.	HC Pur-I	0.88	0.85	-0.43	-0.33	-0.00	0.60	2.86	-1.70	0.04	2.29	0.78	0.07	-0.41	1.15	1.16	0.28
2.	HCPur-II	1.06	0.11	-0.63	-0.33	-0.00	-0.95	-0.05	-0.80	-0.94	-0.57	0.00	-0.17	-0.41	-1.05	-1.01	-0.76
3.	CHCL-I	1.41	1.73	-0.33	-0.33	-0.00	0.82	0.46	0.01	-0.45	2.29	0.78	1.29	-0.41	0.05	0.07	0.13
4.	CHCL-II	1.18	-0.61	-1.17	-0.33	-0.00	-0.95	0.98	-0.49	0.04	-0.57	0.78	0.07	-0.41	0.29	0.31	-0.61
5.	Ratua-I	0.65	1.63	-0.52	3.67	-0.00	-0.95	-0.66	0.51	0.20	-0.57	0.00	-0.17	-0.41	-0.19	-0.17	0.58
6.	Ratua-II	0.76	0.40	0.59	-0.33	-0.00	-0.95	-1.62	-0.39	0.94	-0.57	0.78	0.67	-0.41	1.27	1.28	2.22
7.	GZL	-1.18	-1.22	0.07	1.00	-0.00	-0.51	-0.44	-0.59	-0.37	0.86	-1.54	-1.39	-0.41	-1.17	-1.13	-1.06
8.	BMNL	-1.32	-0.64	0.37	-0.33	-0.00	0.38	-0.17	0.82	1.02	-0.57	2.31	2.51	-0.41	1.63	1.64	0.88
9.	HB Pur	-1.29	-1.03	-0.37	-0.33	-0.00	-0.29	0.13	1.42	2.58	-0.57	0.00	1.29	-0.41	0.41	0.43	0.13
10.	OLM	0.26	-1.03	-0.31	-0.33	-0.00	0.38	-0.99	-0.80	1.60	-0.57	0.00	-0.17	2.53	0.29	0.31	-1.76
11.	ENGB	0.64	-0.38	-0.25	-0.33	0.01	1.49	-0.08	2.63	0.29	0.86	-1.54	-0.66	2.53	-0.31	-0.65	1.62
12.	MNK	0.03	-0.96	-1.31	-0.33	-0.00	-0.95	-0.54	0.01	-0.53	-0.57	0.00	-0.17	-0.41	1.02	1.04	-0.76
13.	KLK-I	-1.09	1.70	2.72	-0.33	-0.00	2.38	0.89	0.01	-0.70	-0.57	-1.54	-0.66	-0.41	-1.78	-1.73	0.32
14.	KLK-II	-0.79	-0.28	-0.08	-0.33	-0.00	-0.95	-0.38	-0.39	-0.94	-0.57	0.00	-1.39	-0.41	-0.07	-0.05	-0.76
15.	KLK-III	-1.15	-0.25	1.67	-0.33	-0.00	0.38	-0.35	-0.19	-0.94	-0.57	-0.78	-0.41	-0.41	-1.54	-1.49	-1.51

Source: Computed from Census of India 2001, District Statistical

Table 5.2: Composite Mean Z-Score of Socio-Economic Development

Malda District

(2001)

Sl. No.	Block	Composite Mean Z-Score								Rank in Socio-Economic Development
		Education	Health	Communication and Transportation	Market, Electricity and Drinking Water	Agro-Economy	Finance and Veterinary	Recreation	Socio-Economy	
1.	HC Pur-I	0.02	0.02	0.24	-0.09	0.35	0.30	0.54	0.19	04
2.	HCPur-II	-0.65	-0.64	-0.29	-0.35	-0.75	-0.50	-0.81	-0.45	15
3.	CHCL-I	0.11	0.81	0.15	1.24	0.54	0.78	-0.04	0.50	02
4.	CHCL-II	-0.44	-0.09	-0.62	-0.03	-0.13	-0.03	-0.10	-0.23	12
5.	Ratua-I	-0.21	-0.10	0.27	0.60	0.54	-0.01	-0.05	0.17	05
6.	Ratua-II	-0.06	-0.46	0.68	-0.01	-0.16	0.17	1.09	0.15	06
7.	GZL	0.36	0	-0.33	-0.54	-0.32	-0.61	-0.94	-0.30	13
8.	BMNL	0.89	0.74	-0.03	0.01	-0.24	1.22	0.93	0.43	03
9.	HB Pur	0.35	-0.04	-0.26	-0.30	-0.45	0.94	0.14	0.01	07
10.	OLM	-0.51	0.18	-0.48	-0.45	-0.29	0.01	0.59	-0.19	11
11.	ENGB	1.38	1.13	0.47	0.09	0.16	0.32	0.80	0.61	01
12.	MNK	-0.06	-0.21	0.11	-0.13	-0.58	-0.25	0.22	-0.14	10
13.	KLK-I	-0.57	-0.22	0.60	0.14	0.89	-0.70	-0.9	-0.0	08
14.	KLK-II	-0.20	-0.38	0.15	0.83	-0.40	-0.66	-0.32	-0.13	09
15.	KLK-III	-0.43	-0.68	-0.24	-0.91	0	-0.58	-1.24	-0.42	14

Source: Computed by author.

Table 5.3: Levels of Socio-Economic Development

Malda District

(2001)

Levels of Development	Composite Mean Z-Score	Number of Blocks	Name of the Blocks
Levels of Educational Development			
High	Above +0.27	04 (26.67%)	GZL, BMNL, HB Pur and ENGB
Medium	-0.27 to +0.27	06 (40.0%)	HCPur-I, CHCL-I, Ratua-I, Ratua-II, MNK and KLK-II
Low	Below –0.27	05 (33.33%)	HCPur-II, CHCL-II, OLM, KLK-I and KLK-III
Levels of Health Development			
High	Above +0.26	03 (20.0%)	CHCL-I, BMNL and ENGB
Medium	-0.25 to +0.26	08 (53.33%)	HC Pur-I, CHCL-II, Ratua-I, GZL, HBPur, OLM, MNK and KLK-I
Low	Below –0.25	04 (26.67%)	HC Pur-II, Ratua-II, KLK-II and KLK-III
Levels of Communication & Transport Development			
High	Above +0.22	05 (33.33%)	HCPur-I, Ratua-I, Ratua-II, ENGB and KLK-I
Medium	-0.16 to +0.22	04 (26.67%)	CHCL-I, BMNL, MNK and KLK-II
Low	Below –0.16	06 (40.0%)	HCPur-II, CHCL-II, GZL, HBPur, OLM and KLK-III
Levels of Development in Market, Electricity & Drinking Water			
High	Above +0.27	03 (20.0%)	CHCL-I, Ratua-I and KLK-II
Medium	-0.26 to +0.27	06 (40.0%)	HCPur-I, Ratua-II, BMNL, ENGB, MNK and KLK-I
Low	Below –0.26	06 (40.0%)	HCPur-II, CHCL-II, GZL, HBPur, OLM and KLK-III
Levels of Agro-Economic Development			
High	Above 0.17	04 (26.27%)	HC Pur-I, CHCL-I, Ratua-I, and KLK-I
Medium	-0.28 to 0.17	05 (33.33%)	CHCL-II, Ratua-II, BMNL, ENGB and KLK-III
Low	Below –0.28	06 (40.0%)	HC Pur-II, GZL, HBPur, OLM, MNK and KLK-II
Levels of Development in Finance & Veterinary			
High	Above +0.31	04 (26.27%)	CHCL-I, BMNL, HB Pur and ENGB
Medium	-0.26 to +0.31	06 (40.0%)	HCPur-I, CHCL-II, Ratua-I, Ratua-II, OLM and MNK
Low	Below –0.26	05 (33.33%)	HC Pur-II, GZL, KLK-I, KLK-II and KLK-III

Levels of Recreational Development			
High	Above +0.34	05 (33.33%)	HC Pur-I, Ratua-II, BMNL, OLM and ENGB
Medium	-0.36 to +0.34	06 (40.0%)	CHCL-I, CHCL-II, Ratua-I, HB Pur, MNK and KLK-II
Low	Below –0.36	04 (26.66%)	HC Pur-II, GZL, KLK-I and KLK-III
Levels of Socio-Economic Development			
High	Above +0.17	04 (26.67%)	HC Pur-I, CHCL-I, BMNL and ENGB
Medium	-0.14 to +0.17	05 (33.33%)	Ratua-I, Ratua-II, HBPur, KLK-I and KLK-II
Low	Below –0.14	06 (40.0%)	HC Pur-II, CHCL-II, GZL, OLM, MNK and KLK-III

Source: Compiled by author.

English Bazar block while lowest i.e.,-0.65 by Harishchandrapur-II block. Three levels of educational development based on composite mean Z-score are as follows;

High Level of Educational Development (>+0.27)

Table 5.3 exhibits that four blocks of the district account the composite mean Z-score of more than +0.27 are put under high level of educational development. The blocks of this category are English Bazar (1.38) Bamangola (0.89), Gazole (0.36) and Habibpur (0.35). It covers 1382.4 sq. km. (38.6 %) of the total area (3583 sq. km.), contains 997999 persons (30.33 percent) of total population (3,290,468 persons) and includes 775 settlements (47.08 %) of total settlements (1646 settlements) in the district. This region lies in the eastern and south eastern part of the district. The region is mainly dominated by Scheduled Tribe and Scheduled Caste people and therefore getting the advantages of allocation of educational institution under the government programme for their development.

Medium level of Educational Development (-0.27 to +0.27)

With composite mean Z-score ranging +0.27 to -0.27, six blocks i.e. CHCL-I (0.11), H.C. Pur-I (0.02), Ratua-II (-0.06), MNK (-0.06), KLK-II (-0.20) and Ratua-I (-0.21) are falling under the medium level of educational development. This region covers an area of 1185.6 sq. km. (33.08%) and 469 settlements (28.50%). It has 34.63 percent of total population of the study area. It lies in the northern and western part of the district (Fig. 5.1).

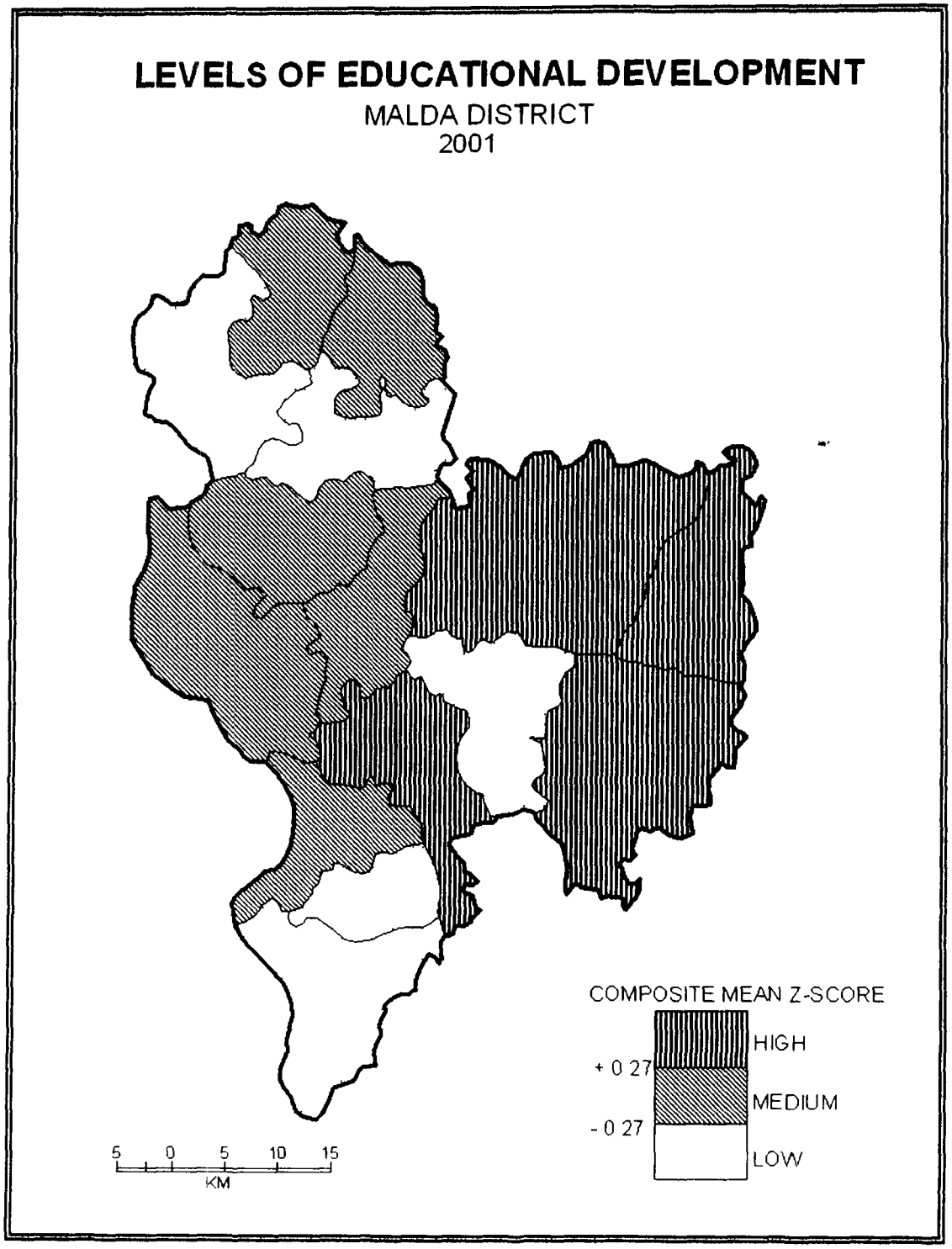
LEVELS OF EDUCATIONAL DEVELOPMENT
MALDA DISTRICT
2001
COMPOSITE MEAN Z-SCORE
HIGH
+ 0 27
MEDIUM
- 0 27
LOW
5 0 5 10 15
KM

Fig. 5.1

Low Level of Educational Development (<-0.27)

Table 5.3 exhibits that five blocks i.e. Kaliachak-III (-0.43), Chanchal-II (-0.44), Old Malda (-0.51), Kaliachak-I (-0.57) and Harishchandrapur-II (-0.65) with composite mean Z-score below –0.27 are categorized under the low level of educational development. It contains 35.04 percent of total population and 24.42 percent of total settlements of the district. The region spreads over 1014.9 sq. km. (28.32 %) area lies in three different parts i.e., north western, south eastern and last one in southern part of the district (Fig. 5.1). Unplanned allocation of educational institution in accordance with the size of population of settlements attributed to the low level of educational development in the region.

5.2 LEVELS OF HEALTH DEVELOPMENT

Regional inequalities in the levels of health development has been analysed based on six variables of medical and healthcare are, number of primary health sub-centre per 10,000 persons (X_7), number of primary health centre per 10,000 persons (X_8), number of health centre per 10,000 persons (X_9), number of dispensary per 10,000 persons (X_{10}), number of hospital per 10,000 persons (X_{11}) and number of nursing home per 10,000 persons (X_{12}).

It is observed from the Table 5.2 that the highest composite mean Z-score of health development is recorded by English Bazar block (1.13) while lowest by Kaliachak-III block (-0.68). Table 5.3 and Figure 5.2 depicts three levels of health development i.e., high, medium and low.

High Level of Health Development (>+0.26)

With composite mean Z-score more than 0.26, three blocks i.e., English Bazar (1.13), Chanchal-I (0.81) and Bamongola (0.74) lies under high level of health care facilities (Table 5.3). It covers an area of 633.7 sq. km. (17.69%) and is distributed in three different parts, in north eastern, eastern and south eastern part in the district. 21.45 percent of settlements and 20.95 percent of population of the study area comes under this category. Tow blocks of this group i.e., English Bazar and Chanchal-I enjoys an advantage of location of district head quarter and sub-division headquarter respectively are having different types of medical facilities,

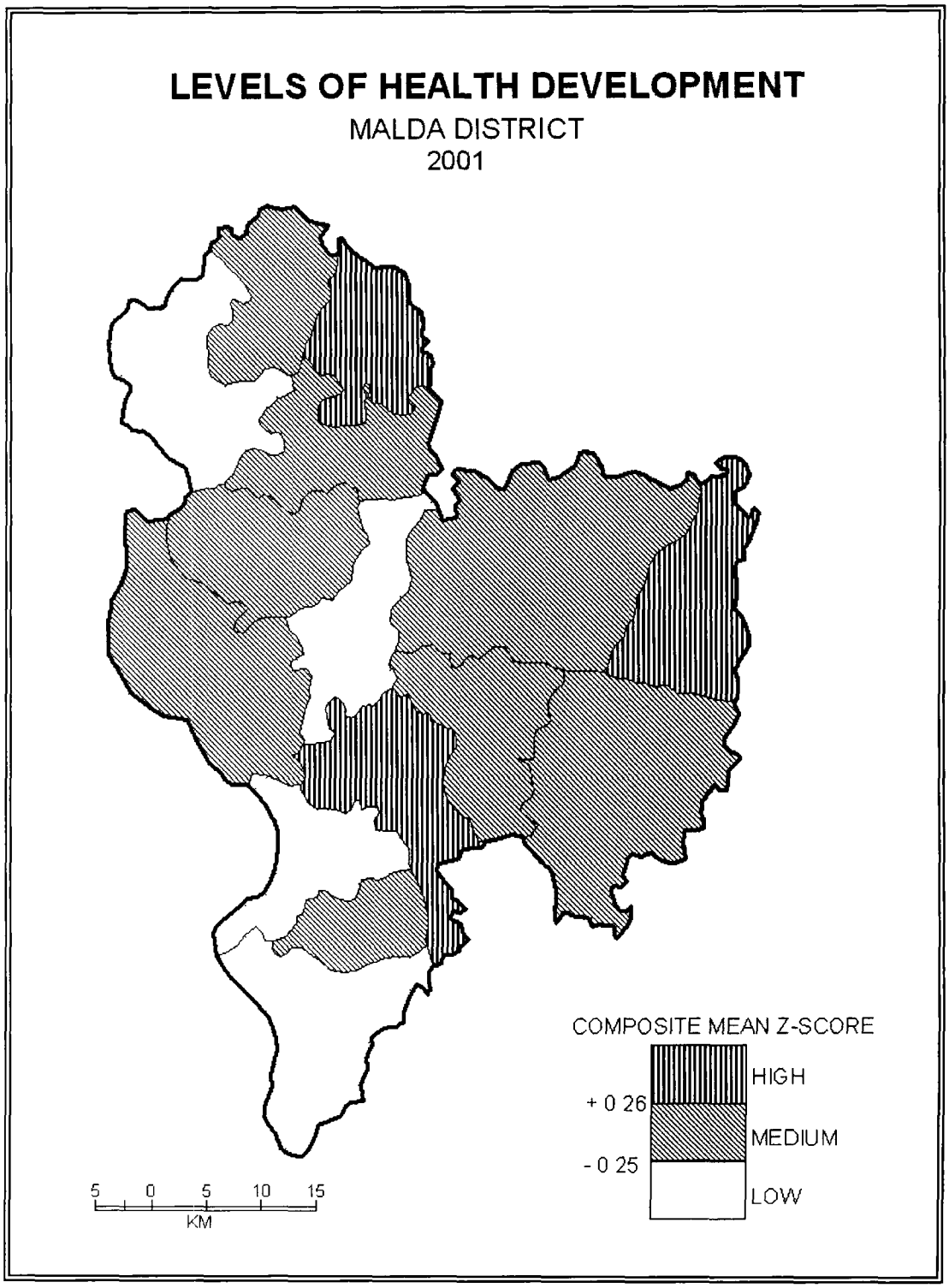
LEVELS OF HEALTH DEVELOPMENT
MALDA DISTRICT
2001
COMPOSITE MEAN Z-SCORE
HIGH
+ 0 26
MEDIUM
- 0 25
LOW
5 0 5 10 15
KM

Fig. 5.2

moreover, well connectivity with means of transportation and communication facility. However, in Bamangola block small size with very low inter spacing of settlements with well connectivity by means of transportation and communication has good accessibility to the available medical facilities. These are the causative factors of high level of health development in this area.

Medium level of Health Development (-0.25 to +0.26)

The blocks with composite mean Z-score ranging –0.25 to +0.26 are categorised under the medium level of health development. It consists of eight blocks of the district are, Old Malda (0.18), Harishchandrapur-I (0.02), Gazole (0), Habibpur (-0.04), Chanchal-II (-0.09), Ratua-I (-0.10), Manikchak (-0.21) and Kaliachak-I (-0.22). It contains 53.08 percent population, comprises 63.91 percent settlements and covers 60.47 percent area of the district. This region lies in three different parts trisected by high and low level regions (Fig. 5.2).

Low level of Health Development (< -0.25)

This region comprises four blocks of the district i.e., Harishchandrapur-II (-0.64), Ratua-II (-0.46), Kaliachak-II (-0.38) and Kaliachak-III (-0.68) with mean composite Z score less than -0.25 (Table 5.2 and Fig. 5.2). It spreads over 21.84 percent of area of the district. This region records 25.97 percent (854,534 persons) population and 14.64 percent settlements (i.e., 241) of the study area. Government's allocation of medical facility could not keep pace with the growth of population which led to the gradual declining of the level of health development in these blocks.

5.3 LEVELS OF COMMUNICATION AND TRANSPORTATION DEVELOPMENT

Four variables of communication and four variables of transportation have been taken into consideration for the analysis are, number of branch post office per 10,000 persons (X_{13}), number of sub-post office per 10,000 persons (X_{14}), number of post and telegraph office per 10,000 persons (X_{15}), number of settlements with telephone facility to total inhabited settlements (X_{16}), number of fare bus stop per 100 sq. km. area (X_{17}), number of bus station per 100 sq. km. area (X_{18}), number of railway station per 100 sq. km. area (X_{19}) and number of settlements with pucca road facility to total inhabited settlements (X_{20}).

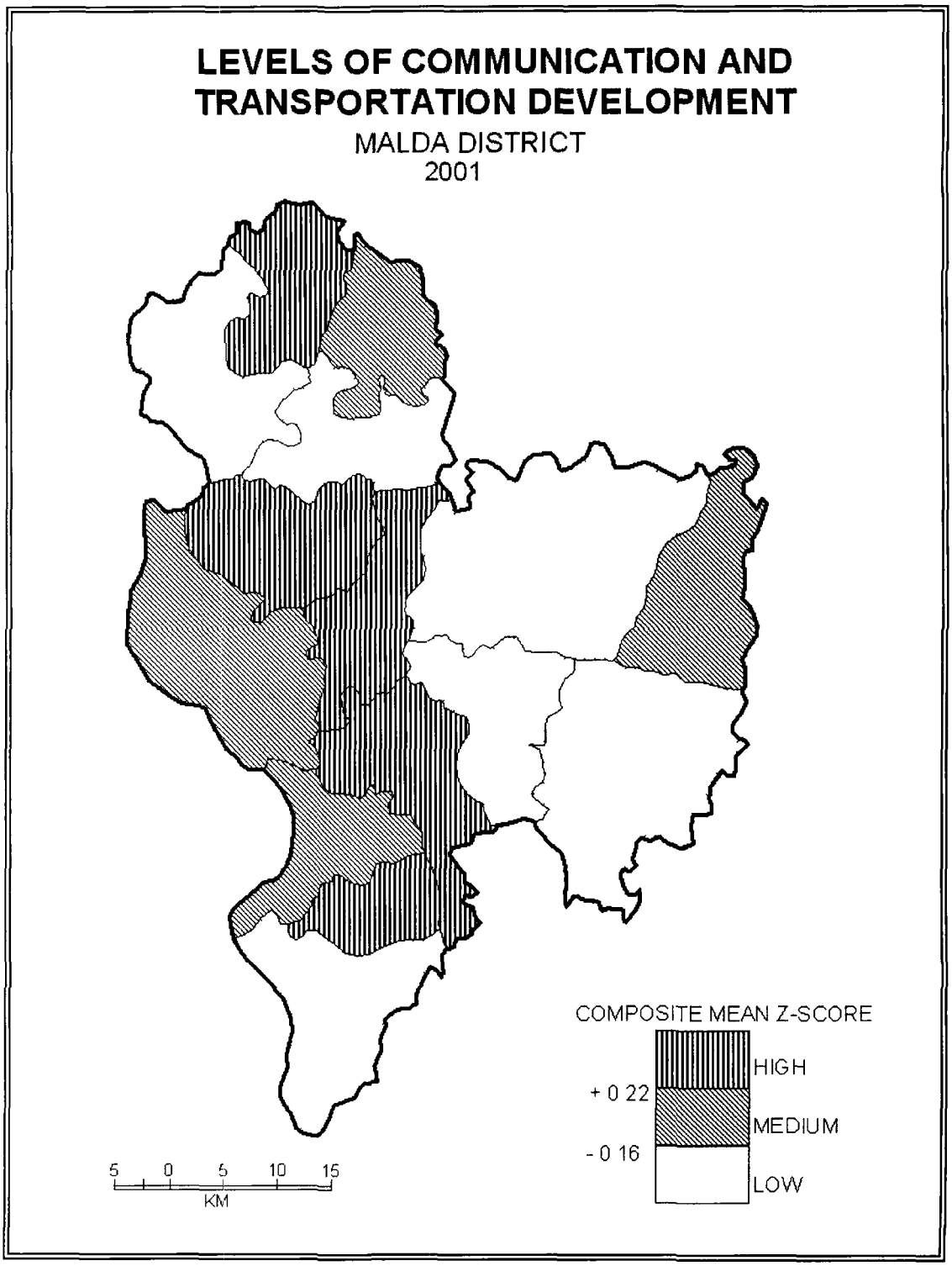
LEVELS OF COMMUNICATION AND TRANSPORTATION DEVELOPMENT
MALDA DISTRICT
2001
COMPOSITE MEAN Z-SCORE
HIGH
+ 0 22
MEDIUM
- 0 16
LOW
5 0 5 10 15
KM

Fig. 5.3

Highest composite mean Z-score (CS) of transportation and communication facility i.e., 0.68 is attained by block Ratua-II followed by block Kaliachak-I (0.60), whereas lowest value i.e., -0.62 is obtained by block Chanchal-II (Table 5.2). Figure 5.3 depicts the three levels of transportation and communication development i.e., high, medium and low, in the district.

High Level of Transportation and Communication Development (>+0.22)

Blocks with CS more than +0.22 are categorized under the high level of transportation and communication development. This group consist of five blocks are, Ratua-II (0.68), Kaliachak-I (0.60), English Bazar (0.47), Ratua-I (0.27) and Harishchandrapur-I (0.24). It covers 24.28 percent (869.9 sq. km.) area and contains 37.63 percent population of the district. This group includes 25.33 percent of total settlements of the study area. This part is the main centre of business and commerce possessing all type of communication facilities and is the main rout of transportation of the district.

Medium Level of Transportation and Communication Development (-0.16 to +0.22)

The composite mean Z-score ranging –0.16 to +0.22 marked for the medium level of transportation and communication development. The blocks of this category are, Chanchal-I (0.15), Kaliachak-II (0.15), Manikchak (0.11) and Bamangola (-0.03). These blocks observed in three different pockets i.e., north eastern, eastern and western part which spreads over 839.9 sq. km. (24.95 %) area of the district. It accounts for 22.11 percent (727,522 persons) of total population and 22.30 percent of settlements of the study area.

Low Level of Transportation and Communication Development (<-0.16)

Six blocks (Table 5.3) have attained the CS value less than –0.16 and they falls under the category of low level of transportation and communication development. It includes highest number of settlements i.e., 862 (52.37 %), population i.e., 1,324,742 persons (40.26 %) and covers highest area i.e., 50.77 percent (1819.1 sq. km.) of the district. The region lies in three scattered parts i.e., north eastern, eastern (except Bamangola block) and southern part in the study area (Fig. 5.3). Due to political factor governmental fund for the development of

means of transportation and communication could not reach to the ground, subsequently region remained in low level of its development.

5.4 LEVELS OF DEVELOPMENT IN MARKET, ELECTRICITY AND DRINKING WATER

Five variables have been taken into consideration for the analysis of regional disparities in the development of market, electricity and potable drinking water are, number of daily market per 10,000 persons (X_{21}), number of periodic market per 10,000 persons (X_{22}), number of regulated market per 10,000 persons (X_{23}), number of settlements with electric facility for domestic purpose to total inhabited settlements (X_{24}) and number of settlements having tap water facility to total inhabited settlements (X_{25}).

Table 5.2 reveals that, the highest composite mean Z-score (CS) of market, electricity and drinking water facility has been recorded in Chanchal-I block (1.24) followed by Kaliachak-II block (0.83), while lowest by Kaliachak-III block (-0.91). Table 5.3 and Figure 5.4 reveal the disparities in its levels of development.

High level of Development in Market, Electricity and Drinking water (> +0.27)

Three blocks with CS more than +0.27 comes under the category of high level of development market, electricity and drinking water facility (Table 5.3). Blocks in this category are Chanchal-I (1.24), Kaliachak-II (0.83) and Ratua-I (0.60). This group covers very small area i.e., 596.5 sq. km. (16.65 %) and few numbers of settlements i.e., 245 (14.88 %). It has little share of population i.e., 18.32 percent in the district. Location of regulated as well as periodic market at the centre surrounded by densely populated area having well connectivity by means of transportation led this region to become high developed one.

Medium Level of Development in Market, Electricity and Drinking Water (-0.26 to +0.27)

Six blocks with the composite mean Z-score ranging –0.26 to +0.27 are categorized under the medium level of development (Table 5.2). The blocks of this category are Kaliachak-I (0.14), English Bazar (0.09), Bamangola (0.01), Ratua-II (-0.01), Harishchandrapur-I (-0.09) and Manikchak (-0.13). It spreads over 1167.3

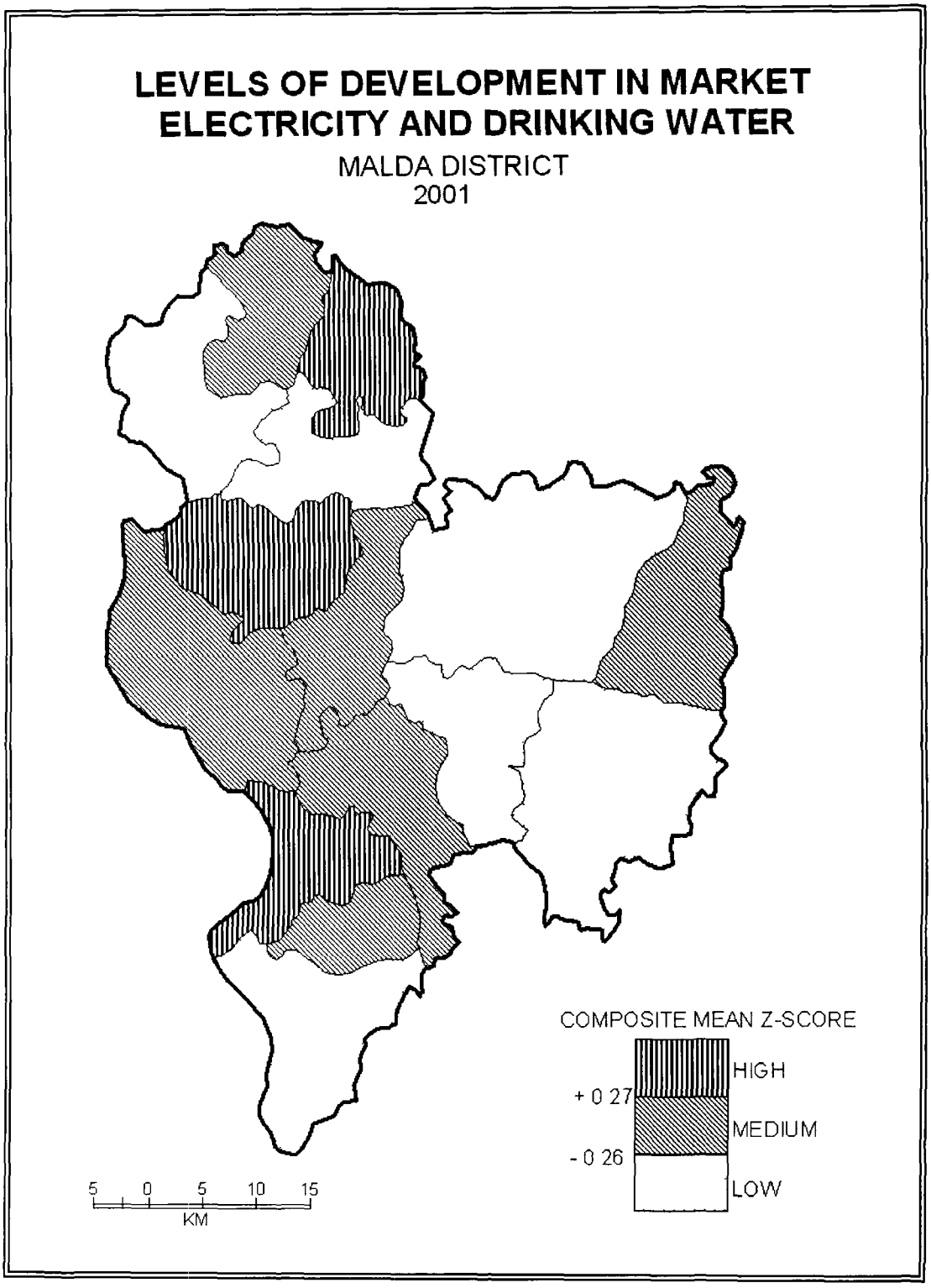
LEVELS OF DEVELOPMENT IN MARKET
ELECTRICITY AND DRINKING WATER
MALDA DISTRICT
2001
COMPOSITE MEAN Z-SCORE
HIGH
+ 0 27
MEDIUM
- 0 26
LOW
5 0 5 10 15
KM

Fig. 5.4

sq. km. area (32.58 %) and encompasses 539 settlements (32.75 %). It accommodates 41.42 percent population of the district.

Low Level of Development in Market, Electricity and Drinking water (< -0.26)

This group comprises six blocks, namely, Chanchal-II (-0.03), Habibpur (-0.30), Harishchandrapur-II (-0.35), Old Malda (-0.45), Gazole (-0.54), and Kaliachak-III (-0.91). It covers largest area and highest number of settlements among the three groups, i.e., 50.77 percent (1819.1 sq. km.) and 52.37 percent (862 settlements) respectively, but contains less population i.e., 40.26 percent (1,324,742 persons) than the medium group which has 41.42 percent of district population. Low level of its development is the result of unplanned allocation of these facilities in unorganised manner that led to their poor accessibility to the mass.

5.5 LEVELS OF AGRO-ECONOMIC DEVELOPMENT

To examine the regional disparities in the agro-economic development, seven variables have been taken under study are, number of settlements with electricity for agriculture to total inhabited settlements (X_{26}), number of agricultural seed distribution centre per 1,000 hectare of Net Cropped Area (NCA) (X_{27}), number of fertilizer distribution centre per 1,000 hectare of NCA (X_{28}), number of cooperative cold store per 1,000 hectare of NCA (X_{29}), number of soil testing centre per 1,000 hectare of NCA (X_{30}), number of agricultural farm and research centre per 1,000 hectare of NCA (X_{31}) and number of agricultural credit societies per 1,000 hectare of NCA (X_{32}).

It is observed from the Table 5.2 that, the highest composite mean Z-score (CS) i.e., 0.89 is achieved by Kaliachak-I block, while lowest i.e., -0.75 is achieved by Harishchandrapur-II block. Table 5.3 and Figure 5.5 depict the levels of agro-economic development in Malda district.

High Level of Agro-Economic Development (>+0.17)

With composite mean Z-score more than +0.17 four blocks exhibits high level of agro-economic development. These blocks are Kaliachak-I (0.89), Chanchal-I(0.54), Ratua-I (0.54) and Harishchandrapur-I (0.35). The region covers 665.3 sq. km. i.e., 18.60 percent area and contain 863,748 persons i.e., 26.25

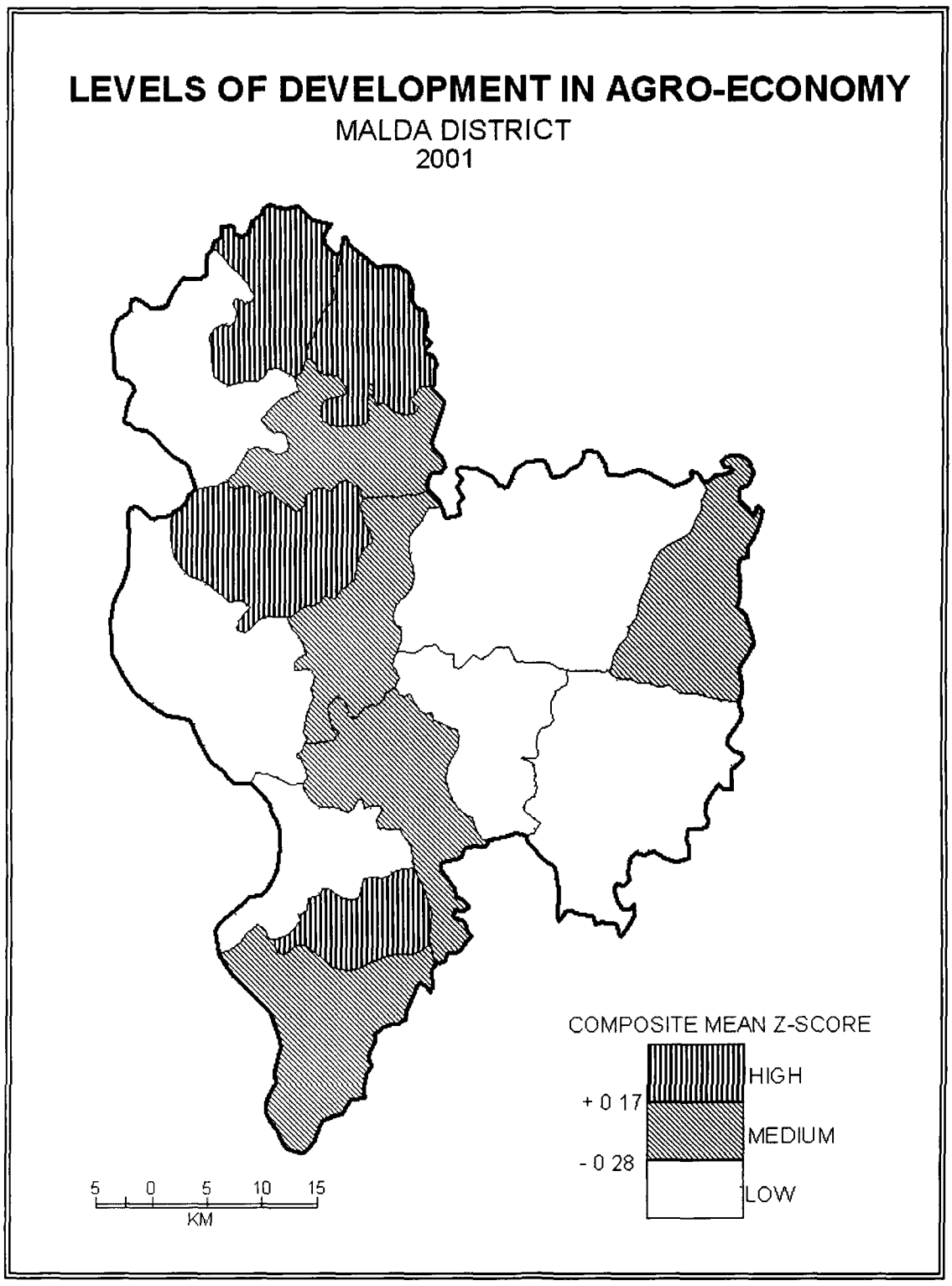
LEVELS OF DEVELOPMENT IN AGRO-ECONOMY
MALDA DISTRICT
2001
COMPOSITE MEAN Z-SCORE
HIGH
+ 0 17
MEDIUM
- 0 28
LOW
5 0 5 10 15
KM

Fig. 5.5

percent population of the district total. Total 355 settlements (21.57 %) come under this region. It lies in three distinct parts i.e., northern, north eastern and southern part in the study area. Well accessibility and connectivity by means of transportation, fertility of soils, low and moderate spacing of settlements is the causative factors of high level of agro-economic development.

Medium Level of Agro-Economic Development (-0.28 to +0.17)

Five blocks with the composite mean Z-score ranging from –0.28 to +0.17 falls under the group of medium level of agro-economic development. Blocks in this category are, English Bazar (0.16), Kaliachak-III (0), Chanchal-II (-0.13), Ratua-II (-0.16) and Bamangola (-0.24). It stretches over more area (i.e., 28.82 percent), includes more settlements (i.e., 27.70 %) and has more people (i.e., 34.22 percent) than the high level region. It does not form a compact region rather one part stretches from north-east to south while another part lies in eastern part of the district (Fig.5.5).

Low level of Agro-Economic Development (< -0.28)

Blocks with composite mean Z-score less than –0.28 are considered as the low developed in agro-economy. Six blocks which are grouped under this category are Old Malda (-0.29), Gazole (-0.32), Kaliachak-II (-0.40), Habibpur (-0.45), Manikchak (-0.58) and Harishchandrapur-II (-0.75). The area, settlements and population under this group recorded highest than both the high and medium level of agro - economic development. It covers 1884.8 sq. km (52.60 %) area and contains 1,300,722 persons (39.53 %) of district population. The region comprises 835 settlements (50.73 %) of the district. It is trisected by both high and medium level regions and lies in north-western, western and eastern part (except Bamangola block) of the study area (Fig.5.5). Low level of development may be attributed to the political biasness in providing agro-economic facilities in an organised pattern so that its fruits can equally be distributed to the mass.

Relationship between Agro-Economic Development and Agricultural Crop Productivity

Assessment of significance of agro-economic facilities (independent variables) on agricultural crop productivity (dependent variables) has been made taking blocks as unit of study. Analysis reveals that productivity of food grain is positively correlated with electricity for agriculture (X_{26}) and fertilizer distribution centre (X_{28})

at 1 percent level of significant at 13 degree of freedom. However, agricultural seed distribution centre (X_{27}) is positively correlated to the productivity of food grain, commercial crop and overall crop at 5 percent level of significant. Productivity of commercial crop and overall crop are positively correlated to X_{26} with significant at 2 percent level. While variables of X_{29}, X_{30}, X_{31} and X_{31} are very poorly associated with productivity of crops at unaccepted level of significance (Table 5.4). It may be ascertained from the analysis that the agro-economic facilities like X_{26}, X_{27} and X_{28} have a significant role in the production and productivity of agricultural crops in the district.

Table5.4: Relationship between Agro-Economic Facilities and Crop Productivity Malda District (2001)

Agro-Economic Variables	Crop Productivity		
	Food Grain	Commercial Crop	Overall Crop
X_{26}	0.651*	0.601**	0.626**
X_{27}	0.545***	0.557***	0.536***
X_{28}	0.657*	0.531***	0.621**
X_{29}	-0.061	-0.021	-0.123
X_{30}	0.313	-0.06	0.304
X_{31}	0.213	0.119	0.229
X_{32}	-0.092	0.129	-0.131

Source: computed by author.

Note: Correlation * 1 percent, ** 2 percent and *** 5 percent level of significance at 13 degree of freedom.

5.6 LEVELS OF FINANCE AND VETERINARY DEVELOPMENT

Regional disparities in the levels of development of finance and veterinary services are examined on the basis of two variables from finance and three variables from veterinary services are, number of commercial bank per 10,000 persons (X_{33}), number of cooperative commercial bank per 10,000 persons (X_{34}), number of state animal health centre per 10,000 persons (X_{35}), number of block animal health centre per 10,000 persons (X_{36}) and number of additional block animal health centre per 10,000 persons (X_{37}). Their composite mean Z-score has been determined to analyse the disparities in the levels of its development.

Highest composite mean Z-score i.e., 1.22 is attained by Bamangola block followed by Habibpur (0.94), Chanchal-I (0.78) blocks while lowest i.e., -0.70 is scored by Kaliachak-I block (Table 5.2). On the basis of composite mean Z-score,

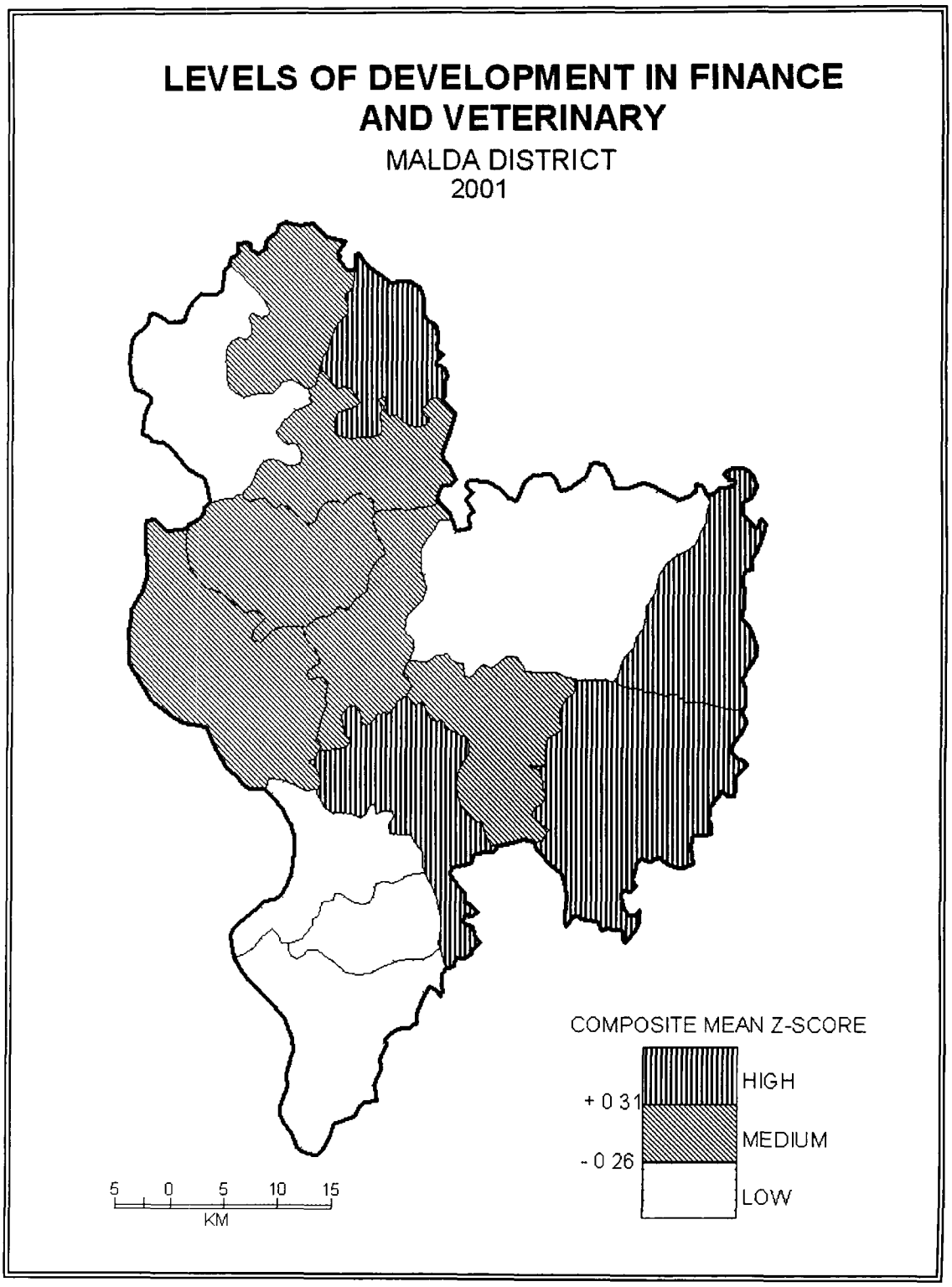
LEVELS OF DEVELOPMENT IN FINANCE AND VETERINARY
MALDA DISTRICT
2001
COMPOSITE MEAN Z-SCORE
+ 0 31
- 0 26
HIGH
MEDIUM
LOW
5 0 5 10 15
KM

Fig. 5.6

blocks of the district have been grouped into three levels of finance and veterinary development i.e., high, medium and low.

High Level of Finance and Veterinary Development (> +0.31)

It is revealed from the Table 5.3 that four blocks of the district with composite mean Z-score above 0.31 viz., Bamangola (1.22), Habibpur (0.94), Chanchal-I (0.78) and English Bazar (0.32) are grouped under the high level of finance and veterinary development. They are located in north-eastern, eastern and south-eastern part of covering 1030.8 sq. km. (28.77 %) of the district. The region includes 35.60 percent of total settlements and contains 26.65 percent of total population. Due to the location of administrative head quarters, English Bazar and Chanchal-I blocks are main centres of business and commerce and have well connectivity by means of transportation and communication, while the location of large number of small private rice mills in Bamangola and Habibpur blocks are the causative factors of high level of finance and veterinary development here.

Medium Level of Finance and Veterinary Development (-0.26 to +0.31)

Blocks with CS ranging between –0.26 and +0.31, are included under medium level of development. These are Harishchandrapur-I (0.30), Ratua-II (0.17), Old Malda (0.01), Ratua-I (-0.01), Chanchal-II (-0.03) and Manikchak (-0.25). It covers 34.91 percent area, 33.85 percent population and 31.47 percent of the study area. It forms a compact region (Fig.5.6).

Low Level of Finance and Veterinary Development (< -0.26)

Five blocks of the district are categorized under the low level of financial and veterinary development (Table 5.3). Blocks with CS less than -0.26 value are Harishchandrapur-II (-0.50), Kaliachak-III (-0.58), Gazole (-0.61), Kaliachak-II (-0.66) and Kaliachak-I (-0.70). The region covers 1301.4 sq. km. area having 39.5 percent of total population of the district. They are located in three distinct parts of the district i.e., north-western, north-eastern and southern part, occupying 542 settlements (32.93 %) of the district. Unplanned allocation of finance and veterinary facilities without proper plan led to the region low developed.

5.7 LEVELS OF RECREATIONAL DEVELOPMENT

Regional disparities in recreational development, has been examined on the basis of four variables are, number of park per 10,000 population (X_{38}), number of

public library per 10,000 persons (X_{39}), number of free reading room per 10,000 persons (X_{40}) and number of cinema talkies per 10,000 persons (X_{41}).

Highest composite mean Z-score i.e., 1.09 in recreational development is achieved in Ratua-II block while lowest i.e., -1.24 in Kaliachak-II block (Table 5.2).

High Level of Recreational Development (> 0.34)

Table 5.3 exhibits that the composite mean Z-score more than 0.34 values comes under high level of recreational development. Five blocks falling in this group are Ratua-II (1.09), Bamangola (0.93), English Bazar (0.80), Old Malda (0.59) and Harishchandrapur-I (0.54). They covers 975.5 sq. km. (27.22 %) lie in three different parts i.e., northern, eastern and central-southern eastern part of the district (Fig.5.7), 31.35 percent population and 521 settlements (31.65 %) of the district. Educational development as well as socio-cultural awareness among the people and good connectivity by means of transportation and communication attributed to the high level of recreational development in these blocks.

Medium Level of Recreational Development (-0.36 to +0.34)

Blocks with CS ranging –0.36 to +0.34 falls under the medium level of recreational development are, Habibpur (0.14), Manikchak (0.22), Chanchal-I (-0.04), Ratua-I (-0.05), Chanchal-II (-0.10) and Kaliachak-II (-0.32). They encompass 42.30 percent area (1515.2 sq. km.), 35.57 percent population and 38.76 percent settlements of the district. Few number of recreation facilities in accordance to population cause to medium level of its development.

Low Level of Recreational Development (< -0.36)

Four blocks i.e., Harishchandrapur-II (-0.81), Kaliachak-I (-0.90), Gazole (-0.94) and Kaliachak-III (-1.24) with composite mean Z-score less than –0.36 are grouped under low level of recreational development. This group covers 1092.2 sq. km. (30.48 %) of total area lies in north-western, north-eastern and southern part in the district. It accounts 33.08 percent (1,088,487 persons) population inhabiting in 487 settlements (29.59 %) of the district. Low level of educational development (except Gazole block mainly dominated by Scheduled Tribe and Scheduled Caste people who are socio–culturally unaware), low level of financial

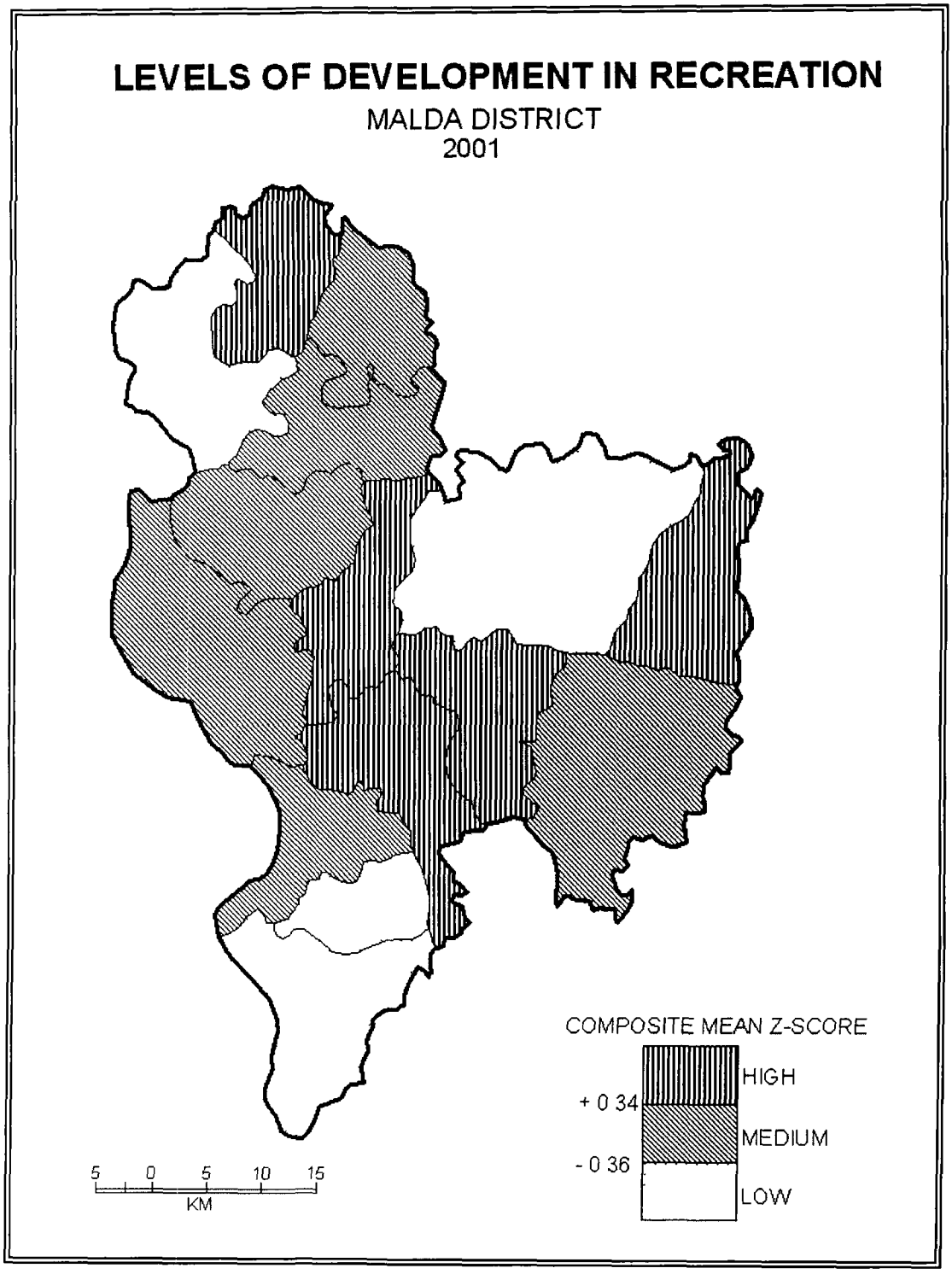
LEVELS OF DEVELOPMENT IN RECREATION
MALDA DISTRICT
2001
COMPOSITE MEAN Z-SCORE
HIGH
+ 0 34
MEDIUM
- 0 36
LOW
5 0 5 10 15
KM

Fig. 5.7

development and poor connectivity by means of transportation and communication led this region to come under the low level of recreational development. However, political practices are also responsible for this.

Existing regional disparities in different socio-economic variables lead to the overall disparities in the levels of socio-economic development at block level.

5.8 LEVELS OF SOCIO-ECONOMIC DEVELOPMENT

On the basis of composite mean Z-scores of 41 variables (i.e. X_1, X_2 ... X_{41}), the index of socio-economic development of each component area unit (block) of the district has been estimated. Blocks of the district have been grouped into three levels of socio-economic development on the basis of their composite mean Z-score.

Table 5.2 reveals that, the highest composite mean Z-score (CS) of 0.61 in socio-economic development is achieved by block English Bazar, followed by blocks Chanchal-I (0.50), and Bamangola (0.43). The lowest CS of -0.45 is attained by block Harishchandrapur-II followed by block Kaliachak-III (-0.42). It is observed from the above discussion and Table 5.2 that, English Bazar block (0.61) arrived at top position whereas Harishchandrapur-II block (-0.45) lies at bottom position in socio-economic development in the district.

High level of Socio-Economic Development (> +0.17)

Table 5.3 and Figure 5.8 reveals that, four blocks of the study region with composite mean Z-score more than +0.17 are categorized under high level of socio-economic development. Blocks of this category are, English Bazar (0.61), Chanchal-I (0.50), Bamangola (0.43) and Harishchandrapur-I (0.19). This region covers 22.47 percent (805.1 sq. km.) of total area lies in northern, eastern and south-eastern part in the study area. It includes 27.76 percent of total settlements and 25.85 percent of total population in the district. English Bazar and Chanchal-I are located with district and sub division head quarters respectively, having number of socio-economic facilities, centres of business and commerce and well accessibility by means of transportation and communication are the causative factors of high level of socio - economic development. However, Bamangola and Harishchandrapur-I blocks are enjoying the political good will for receiving developmental funds.

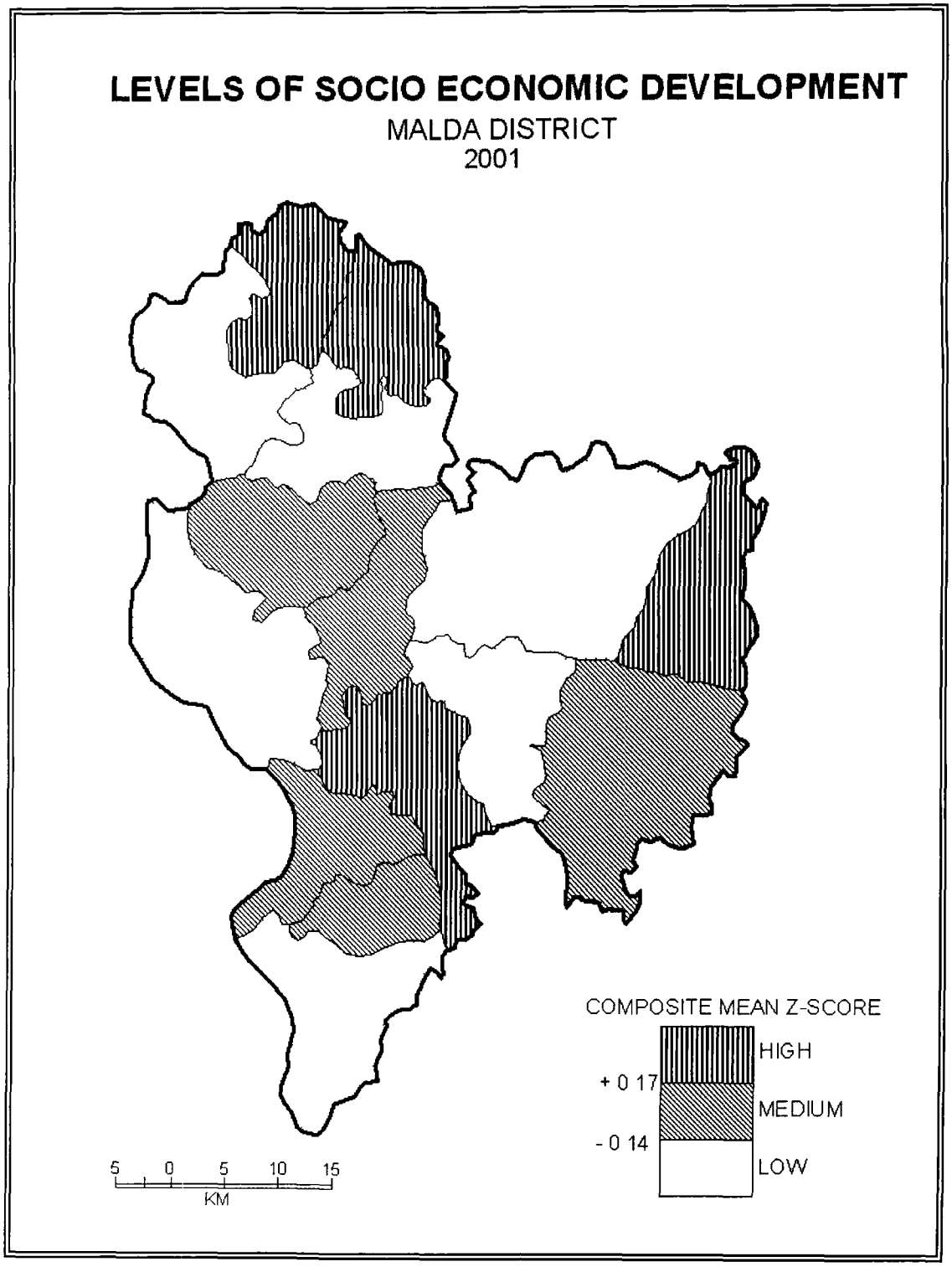
LEVELS OF SOCIO ECONOMIC DEVELOPMENT
MALDA DISTRICT
2001
COMPOSITE MEAN Z-SCORE
HIGH
+ 0 17
MEDIUM
- 0 14
LOW
5 0 5 10 15
KM

Fig. 5.8

Medium level of Socio-Economic Development (-0.14 to +0.17)

Five blocks i.e., Ratua-I (0.16), Ratua-II (0.15), Habibpur (0.01), Kaliachak-I (-0.0) and Kaliachak-II (-0.13) with composite mean Z-score ranging –0.14 to +0.17 are categorised under the medium level of socio-economic development. This region is trisected by both high and low level regions, lies in eastern, central and south-eastern part in the district. It spreads over 1039.4 sq. km (29.01 %) area and contains 33.07 percent of the total population of the study area. The medium level region comprises 29.65 percent of total settlements. Except Habibpur block high density of population could not lead them to come under the high level, but availability of educational, medical, electricity, drinking water and means of transportation and communication facility put under medium level of development.

Low level of Socio-Economic Development (< -0.14)

The composite mean Z-score less than –0.14 comes under level of socio-economic development (Table 5.3 and Figure 5.8). Blocks falling in this group are, Manikchak (-0.14), Old Malda (-0.19), Chanchal-II (-0.23), Gazole (-0.30), Kaliachak-III (-0.42) and Harishchandrapur-II (-0.45). In the district, block Harishchandrapur-II scored lowest index of socio-economic development. It accounts 42.59 percent of settlements covering 48.52 percent area 41.08 percent population of the district. Recurrence of devastating floods in Manikchak and Kaliachak – II and dominance of Scheduled Tribe and Scheduled Caste population in Gazole blocks, lack of educational, medical, transportation and communication, agro-economic, finance and veterinary and recreation facilities are the attributes of low level of socio-economic development. Besides, due to political biasness the transfer of government funds and proper execution regarding local problems, people's demands as well as requirements for development are not being made at grass root level in Harishchandrapur–II is consequently lagged behind block in the study area.

Foregoing analysis reveals that wide regional disparities exist within the district. The analysis further reveals that Harishchandrapur-II block lie under the low level of development in each broad group of socio-economy i.e., education, health, communication and transportation, market, electricity and drinking water,

agro-economy, finance and veterinary, and recreation. In view of the least socio-economic development Harishchandrapur-II block has been selected for micro-level planning as a case study in order to formulate a diagnostic planning model for balanced regional development.

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CHAPTER -6

CENTRAL PLACE THEORY AND HIERARCHICAL ARRANGEMENT OF CENTRAL PLACES

CENTRAL PLACE THEORY AND HIERARCHICAL ARRANGEMENT OF CENTRAL PLACES

Planning for regional development is aimed at achieving the spatial arrangement of facilities in an organized manner so that it can usher socio-economic development in the region. Balanced regional development could be achieved through the enactment of micro-regional planning which envisages assessment and evaluation of resources and participation of the people.

Keeping in view the merits of micro-level planning to achieve balanced regional development, many scholars have adopted different models, theories and concepts for realizing the truth. However, Christaller's Central Place model occupies eminent position among all the models of settlement analysis because it emphasize the analysis of settlement origin, growth and distribution and also gives a direction for development of such function at selected settlement. Keeping in view the merits, it has been used as a tool in the present analysis.

6.1 CENTRAL PLACE THEORY

Central places are those service centres which have attained their central entity to serve their surrounding settlements pertaining to their basic needs. The philosophy of the central place theory was put forwarded by Walter Christaller in 1933. The essence of his theory was based on the two principles that work simultaneously to sustain the central place, i.e. threshold population and range of goods. Christaller envisaged the laws governing the distribution and size of towns, the functions they perform and their arrangements.[1]

The basic aspect of the theoretical formulation is the regularity of distribution and hierarchical arrangement of settlements in a given region. Christaller's concept is based on certain assumptions - the region should be isotropic surface, i.e., under conditions of uniform distribution of population, purchasing power, resources, and transport facilities over a uniform terrain.[2] But it is difficult to find such an isotropic surface and Malda district is not an exception. In the present study, some of the philosophical outlooks of Christaller's model have been considered to carry out the different steps of planning procedure.

The central place model explains that there exists hierarchy of central places in the settlement pattern. The higher order central places provide functions,

which are not available in the lower order places. However, lower order central places offers the facilities, are equally found in the higher order central places. The higher order central places are few in number and more widely spaced than the lower order central places. Another important thing is that the higher order central places have larger area of coverage in contrary to lower order central places. The degree of influence on the surrounding settlements depends on the number and types of facilities available at the central place. Here an assumption is that people avail the goods and services from the nearest place.

Different scholars have adopted Central Place model as the tool of planning for regional development. Misra, *et. al.* (1976)[3] tried to formulate a micro-level planning in order to arrange the socio-economic functions in an organised manner using basic concepts of central places i.e., centrality score of central places and their hierarchical arrangement. Maithini (1986)[4] adopted the concept of central places to work out the hierarchy of settlements based on estimated mean population threshold and centrality score of settlements. For the analysis of dynamic situation involving locations, spread and use of rural service facilities Wanmali (1987)[5] adopted the concept of population threshold and ranking of services, and assessed their accessibility to the rural households. Babu (1988)[6] tried to use the basic concepts like threshold population, hierarchy of central places, complementary regions and functional gaps for the formulation of micro-level planning.

6.1.1 Basic Concepts of Central Place Theory

The basic concepts, which constitute the foundations of the central place theory are;

(i) Centralisation as an ordering principle,

(ii) The central place,

(iii) Importance or centrality of central place,

(iv) Central functions,

(v) The complementary region, and

(vi) Range of goods and Threshold Population.

(i) Centralisation as an Ordering Principle

Christaller's hypothesis is that, services and functions are tending to concentrate in and around certain points (settlements) which are more important than others. More important settlements are less in number, while less important settlements are more.

(ii) The Central Place

The most important aspect of the Christaller's philosophy of central place is the settlement which may be a city, a town or a village. The characteristic feature of central place is to be centre of its surroundings and mediator of local trade and commerce with the outside.[7] Based on the number of services and functions provided and the size of population served by the central places are ranked in hierarchical order. The central places of the higher order cater the need of larger population of larger area in contrary to lower order central places. Lower order central places come under the nesting pattern of next higher order central place.

(iii) Centrality of Central Place

The importance or centrality of settlements does not depend on the total number of population living but it is defined as the functional importance of central place that attract the people of surrounding settlements. The central places are hierarchically arranged depending on their importance or centrality. Higher the centrally of central place greater will be the population dependent on it and vice-versa.

(iv) Central Functions

Christaller conceived central functions, which are not available everywhere but consumed at many scattered settlements and needed by every one. Therefore, the central functions are non-ubiquitous in nature, whereas the ubiquitous functions cannot be treated as central functions. The central functions are not uniform in their importance, rather classified as higher order to lower order based on their importance. In this regard, an interaction of people, flows of goods and communication takes place between the central place and its complimentary

region. It is clear that central functions involve the movement of men and goods, and generates spatial interaction.[8] Christaller considered the central functions are, trade, commerce, banking, administration, education and transportation.[9]

(v) Complementary Region

The central places cannot function in isolation. It provides services and functions to its own population and the population of its surrounding settlements. Their origin, growth and development largely depend on surrounding areas, called as the complementary region, area of influence, service area, hinterland or trade area.[10] The complementary region focuses the inter-relationship and inter-dependence of central place and its surrounding dependent area.

(vi) Range of Goods and Threshold Population

The market range of service activity is the distance people willing to travel to obtain the services and functions. It is the outer limit of market area for the service activity beyond which people will look to another centre.[11] In Christaller's central place concept, the supply and demand of goods and services are determined by freight rate (cost), insurance, storage costs, loss of weight, and in the case of passenger movement, travel cost, travel time and discomfort perceived by the consumer. Considering all these things the spatial range of goods and services are measured by the maximum distance over which the demand of goods are positive and the minimum distance within which the minimum volume of demand from population for goods ensures normal profit to seller. The former is range of goods or upper limit and the latter is 'threshold population' or lower limit.[12] Therefore, threshold population is the minimum population required for functioning of the service activity, below of which the activity will run at loss and in long run it will face closure.[13] However, the concept of range of goods and services is not static, rather varies spatio-temporally due to increasing purchasing power, improvement of socio-economic conditions and the advancement of transportation and communication.

6.2 HIERARCHICAL ARRANGEMNET OF CENTRAL PLACES

Different approaches and methods are adopted to arrive at the hierarchical arrangement of central places. Mainly two approaches are well recognized i.e.,

first approach related to the measurement of centrality of central place based on Median Population Threshold (MPT) of functions provided by it, and another one approach is related to the study of spatial traveling behaviour of the consumers to obtain goods and services. Adopting the first approach, many scholars have conducted researches for the study of hierarchy of central places and their nesting pattern. In this method, the hierarchy of central places is arranged by going through different steps of measuring the functional importance of facilities based on their threshold population and estimating the centrality score or functional importance of central places.

In the second approach, the central places are arranged into hierarchic order measuring their attractive power or the gravitational force tending to interact with the centre for a particular function or group of functions. Adopting this method many researches have been conducted by many scholars prominent among them are Green[14] and Carruthers.[15]

6.2.1 Median Population Threshold and Weightage Score of Facilities

Some aspects of Christaller's central place theory help in identification of hierarchical arrangement of central places. In order to achieve it, different steps in subsequent manner have been followed. Hierarchy is the out come of threshold population, weightage value of each facility and centrality of central place. So, the first step is to estimate the threshold population which is the base of determination of functional importance (weightage value) of each facility. However, centrality has been computed as the composite weightage value of the existing facilities, based on which central places are hierarchically arranged.

Median Population Threshold

Different scholars have tried to measure the population threshold or entry point of services and facilities by adopting different techniques. B.P. Maithini[16] estimated the population threshold as the population–function ratio of each facility separately, which is designated as the Mean Population Threshold or mT. Besides the easy and simple methods of estimation of the population threshold, one complex but authentic, logical and mathematically sound is Reed-Muench[17] method devised by them in 1938 and was used by Hagget and Gunawardena[18] in

1964. This method seeks to find out the location of entry point or population threshold below and above the limit of which all the settlements are lacking and possess the facility respectively. This method is designated as the Median Population Threshold (MPT). According to the Reed-Muench method of MPT, the services and functions are tend to cluster themselves within the definite population size group.[19]

MPT of each amenity and facility is not equal, rather varies from one to another depending on their importance or order of function. The higher order functions have higher value of MPT and vice-versa. On the basis of Reed-Muench method (App. III), MPT of all socio-economic facilities under study have been estimated. Table 6.1 reveals that the computed MPT ranges from 361 persons for the facility Electricity for Domestic Purpose being lowest to 161,500 persons for both the facilities i.e., Soil Testing Centre and District Head Quarter being the highest. The computed MPT of 572 persons for the facility of Primary School implies that, in the existing pattern of distribution of services and facilities, a settlement with population 572 persons is supposed to sustain the location of a primary school in the study region.

Weightage Score of Facilities

The variations of importance of facilities have been identified after assigning a certain weightage to them. Once the MPT were estimated facilities were assigned centrality weights corresponding to their size of MPT. The weightage value has been determined by first assigning an arbitrary value of 01 to the facility having lowest threshold, while the weightage value of other functions has been obtained simply by dividing its MPT by the lowest MPT value in the distribution. For instance, in the district, the weightage value of 01 has been assigned to the facility of Electricity for Domestic Purpose with lowest MPT of 361 persons. Thus, a facility with MPT of 5,804 persons (secondary school) attained the weightage value of 16.08 and so on. In the same way, functional weightage has been assigned to each of the 45 socio-economic facilities in the study (Table 6.1).

The weightage value of facilities is the indicative of their relative importance which can be used for inter-functional comparison. Highest weightage

score is achieved by two facilities, i.e., District Head Quarter (447.37) and Soil Testing Centre (447.37), while lowest weightage score of 01 is attained by the facility of Electricity for Domestic Purpose followed by Primary School (01.58), Electricity for Agriculture (04.88) and so on.

Table 6.1: Median Population Threshold and Weightage Score of Facilities
Malda District
(2001)

Sl. No.	Name of the Facility	No. of Facility	No. of setts. Having the Facility	Median Pop. Threshold (MPT)	Functional Weightage
01.	Primary school	1902	1134	572	1.58
02.	Middle School	309	265	4,573	12.67
03.	Secondary school	217	184	5,804	16.08
04.	Higher Secondary School	62	43	16,481	45.65
05.	College	08	07	51,756	143.37
06.	Professional Training Institute	03	02	72,969	202.13
07.	Primary Health Sub-centre	225	214	5,539	15.34
08.	Primary Health Centre	48	48	16,128	44.67
09.	Health Centre	07	06	58,795	162.87
10.	Dispensary	364	144	6,993	19.37
11.	Hospital	09	07	56,346	156.08
12.	Nursing Home	19	05	61,074	169.18
13.	Branch Post Office	287	273	4,447	12.32
14.	Sub Post Office	34	26	19,680	54.51
15.	Post and Telegraph Office	09	09	52,755	146.13
16.	Telephone	*	515	2,340	06.48
17.	Fare Bus Stop	358	358	3,499	9.69
18.	Bus Station	20	20	35,883	99.40
19.	Railway Station	23	23	33,018	91.46
20.	Pucca Road	*	554	2,181	06.04
21.	Daily Market	75	75	11,685	32.37
22.	Periodic Market	151	151	6,802	18.84
23.	Regulated Market	02	02	79,728	220.85
24.	Electricity for Domestic Purpose	*	1,285	361	01.00
25.	Tap Water	*	170	6,202	17.18
26.	Electricity for Agriculture	*	606	1,761	04.88
27.	Agricultural Seed Distribution Centre	81	49	14,688	40.69
28.	Fertilizer Distribution Centre	1,068	270	4,454	12.34
29.	Cooperative Cold Store	02	02	79,728	220.85
30.	Soil Testing Centre	01	01	161,150	447.37
31.	Agricultural Farm and Research Centre	10	09	49,314	136.60

32.	Agricultural Credit Society	161	157	6,571	18.20
33.	Commercial Bank	80	65	13,024	36.08
34.	Cooperative Commercial Bank	35	27	28,282	78.34
35.	State Animal Health Centre	04	04	64,029	177.36
36.	Block Animal Health Centre	15	15	41,982	116.29
37.	Additional Block Animal Health Centre	16	16	44,527	123.34
38.	Block Head Quarter	15	15	40,892	113.27
39.	Police Station	11	11	46,502	128.81
40.	Sub-Division Office	02	02	75,944	210.37
41.	District Head Quarter	01	01	161,500	447.37
42.	Park	03	02	68,464	189.65
43.	Public Library	105	100	9,297	25.75
44.	Free Reading Room	104	100	9,297	25.75
45.	Cinema Talkies	33	25	25,830	71.55

Note: * In case of functions Sl. No. 16, 20, 24, 25 and 26 are not counted in number, rather counted as the number of settlements having that function.

Relationship between Socio-Economic Facilities and Population

In the study, an endeavor has been made to analyse the relationship between existing socio-economic facilities and the distribution of population among the settlements of different size group. Population is the prominent factor in the initiation of process of development. Socio-economic facilities are the function of population distribution, and the adequacy of socio-economic facilities in a region is the process of change in the size and quality of life of its population. To examine the relationship, distribution of settlements, population and the composite score of socio-economic facilities have been classified on the basis of population size group of settlements (Table 6.2).

Distribution of Population

Table 6.2 and Figure 6.1 depict the salient features of the distribution of population among different size group of settlements as follows;

i) Small size group of settlements having population below 500 persons accounted for more than 28 percent, but accommodates only 4.04 percent of total population.

ii) The settlements being larger in size having population more than 10,000 persons share only 2.19 percent, but provide accommodation to more than 20 percent of the population, and

iii) Both the settlement curve and population curve do not correspond to each other. This trend indicates the uneven distribution pattern of settlements and population in the district.

Table 6.2: Distribution of Population, Socio-Economic Facilities and Settlements among the Size Group of Settlements
Malda District
(2001)

Size of Settlements (persons)	Settlements		Population		Socio-Economic Facilities	
	No.	%	No.	%	Composite Score*	%
< 250	189	11.48	28,674	0.87	439.49	0.45
250-499	280	17.01	104,402	3.17	2199.18	2.26
500-999	360	21.87	258,772	7.86	5367.55	5.51
1000-1999	354	21.51	491,225	14.93	12213.01	12.53
2000-4999	316	19.20	990,575	30.11	31013.76	31.83
5000-9999	111	06.74	755,117	22.95	19158.90	19.66
>10,000	36	2.19	661,703	20.11	27044.82	27.76
Total	1646	100.0	3,290,468	100.0	97436.71	100.0

*In case of five facilities like, Tel., PR, EDP, TW and EA (abbreviations refer to the list of abbreviations) which are not counted in number, therefore are not included in this analysis.

Distribution of Facilities

Figure 6.1 depicts that both the population curve and functional curve runs somewhat corresponding to each other, but the deviation of functional curve from the population at every size class of settlements indicate that more socio-economic facilities should be provided for ensuring rational spatial development in the district.

To examine the causal relationship between spatial distribution of socio-economic facilities and population among the settlements of size group, Karl Pearson's technique of correlation coefficient has been adopted and the level of significance has been tested using student's 't' test technique. Two variables i.e., percent composite score of weightage value of socio-economic facilities being independent (X) and the percent of population being dependent (Y) (Table 6.2) are

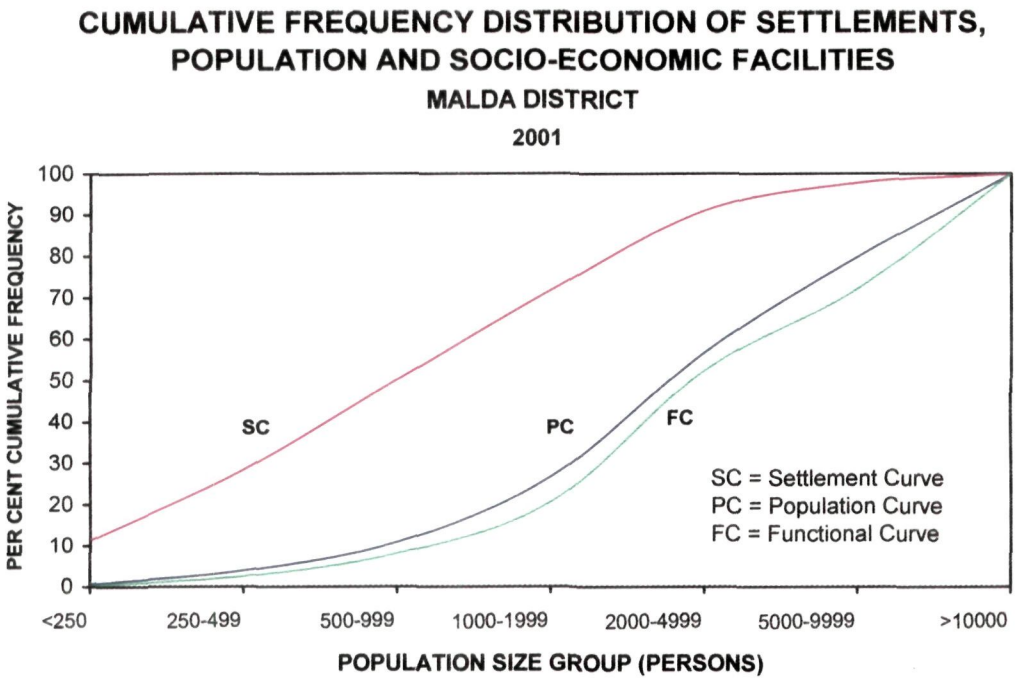
CUMULATIVE FREQUENCY DISTRIBUTION OF SETTLEMENTS, POPULATION AND SOCIO-ECONOMIC FACILITIES
MALDA DISTRICT
2001
PER CENT CUMULATIVE FREQUENCY
100
90
80
70
60
50
40
30
20
10
0
SC
PC
FC
SC = Settlement Curve
PC = Population Curve
FC = Functional Curve
<250
250-499
500-999
1000-1999
2000-4999
5000-9999
>10000
POPULATION SIZE GROUP (PERSONS)

Fig. 6.1

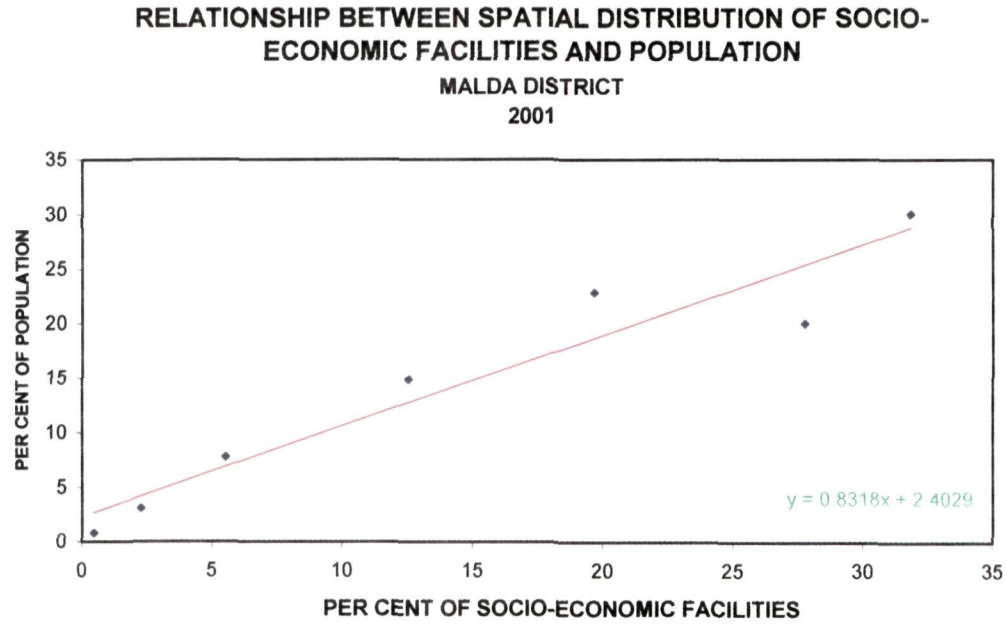
RELATIONSHIP BETWEEN SPATIAL DISTRIBUTION OF SOCIO-ECONOMIC FACILITIES AND POPULATION
MALDA DISTRICT
2001
PER CENT OF POPULATION
35
30
25
20
15
10
5
0
y = 0.8318x + 2.4029
0
5
10
15
20
25
30
35
PER CENT OF SOCIO-ECONOMIC FACILITIES

Fig. 6.2

order of functional hierarchy with their weightage value below 50. Only three facilities, i.e. sub post office, cooperative commercial banks and cinema talkies have been identified in 3rd hierarchic order. Six facilities with functional importance more than 200 are considered in the 6th order of hierarchy rendering highest order function in the district.

6.2.2 Centrality Score and Hierarchical Arrangement of Central Places

The centrality score of service centres is defined as an objective measure of its functional importance. It depends on the number and types of the existing facilities provided by the central place. In other words, centrality score is the sum of weightage score of all the functions provided by the central place.

The weightage value assigned to each of the functions was multiplied by their number in order to arrive at the centrality score of central place. By considering the types and number of services available in a central place, it is easy to estimate its centrality score. For example, if a central place has four Primary Schools (weightage value of 01.58), two Middle Schools (weightage value of 12.67), two Dispensaries (weightage value of 19.37) and the settlement has Electricity for Domestic Purpose (weightage value of 01), the centrality score of that settlement would be, (4 X 01.58) + (2 X 12.67) + (2 X 19.37) + 01 = 71.4. Centrality score of all central places were calculated in the same way.

Identification of Central Places

A settlement is not considered as central place unless it provides services and facilities to its own population and to the population of its surrounding settlements. There are 1646 settlements (rural and urban settlements) in the district. All the settlements are not considered as central place or service centre. A settlement is considered as central place which has at least 1,000 persons in total. In the analysis, the criteria have been adopted for the identification of central place are, (i) it holds a permanent establishment, (ii) it has total population of 1,000 persons and more, and (iii) it provide at least five different functions. When the three criteria are fulfilled, a settlement is considered as central place for the study. On the basis of defined criteria as many as 361 settlements have been identified as central places in the district.

Centrality Score and Hierarchy of Central Places

Hierarchy of central places refers to the stepwise differentiation of settlements based on the types and number of functions offered by it. Generally, there are central settlements that provide some essential services to the cluster of settlements around it. The central settlements provide services and facilities of different orders. The settlements which have higher centrality score providing higher order services are considered as higher order central place while, it is contrary to the settlements having lower centrality score. Lower order central places are functionally linked with the next higher order centre. Thus we get a hierarchy of central places in the study region. On the basis of centrality score, the central places have been classified into six hierarchic orders starting from first order (lowest order) to sixth order (highest order), using the value of mean and standard deviation (Table 6.4 and Fig. 6.3).

Table 6.4: Hierarchical Classification of Central Places
Malda District
(2001)

Hierarchic Order	Class Interval of Centrality Score	Central Place		
		Number	Mean Spacing (km.)	Percent
First order	Below 236.09	274	3.89	75.90
Second order	236.09-788.90	71	7.63	19.67
Third order	788.90-1341.71	11	19.39	3.04
Fourth order	1341.71-1894.52	03	37.14	0.83
Fifth order	1894.52-2447.33	01	64.33	0.28
Sixth order	Above 2447.33	01	64.33	0.28
Total	--	361	--	100

The class interval is based on the mean value of 236.09 and value of standard deviation i.e., 552.81 of total centrality score of all central places (i.e., 361) in the district, whereas mean value has been taken as the lower limit below of which all settlements fall in first order hierarchy, and value of standard deviation as the class interval of each hierarchic order. It is observed from the analysis that, as the hierarchical order of central place increases with higher centrality score, the number of central place decreases but their mean spacing tend to increase (Table 6.4). Table 6.5 exhibits the block wise distribution of central places of each hierarchic order. Table 6.5 reveals that Harishchandrapur-II, Chanchal-II and

Ratua-II blocks have recorded only first order and second order central places mainly due to the availability of lower order and lack of higher order facilities.

First Order Central Places

In the hierarchical pattern, all the central places with centrality score less than 236.09 are categorised in the first order hierarchy. 274 central places have been identified this hierarchy (Fig. 6.3). Ranipura in HC Pur-I block, is the first order central place has accounted lowest centrality score, i.e. 17.31 (App. IV). Mean spacing of the central places of this hierarchy is 3.89 km. (Table 6.4). The Block Head Quarter of Harishchandrapur-II block is located at Khanta lies in this hierarchic order of central places with centrality score 206.62.

Second Order Central Places

There are 71 settlements with the centrality score ranging from 236.09 to 788.90 are considered as the second order central places in the district (Table 6.4). It is important that two central places of this hierarchic order i.e., Malatipur and Pukhuria are the Block Head Quarters of Chanchal-II and Ratua-II blocks with centrality score 523.25 and 703.423 respectively (App. IV). Second order central places are located at the mean spacing of 7.63 km. (Table 6.4).

Third Order Central Places

Table 6.4 reveals that with centrality score 788.90 to 1341.7 as many as 11 central places have been identified under the third order hierarchy. Of them 08 central places are the Block Head Quarters, i.e., Ratua (Ratua-I block), Rangabhita (Gazole block), Bamangola (Bamangola block), Habibpur (Habibpur block), Manikchak (Manikchak block), Baliadanga (Kaliachak-I block), Mothabari (Kaliachak-II block) and Baishnabnagar (Kaliachak-III block) (App. IV). Central places of this hierarchy are located at 19.37 km. mean spacing.

Fourth Order Central Places

The lower and upper limit of centrality score of the fourth order central places are 1341.71 and 1894.52 respectively. Only 03 central places i.e., Uttar Harishchandrapur, Shamsi and Old Malda with centrality score 1691.75, 1742.53 and 1857.50 respectively (App. IV) have been identified in fourth order hierarchy. They provide variety of functions of higher functional importance. Only Old Malda is urban centre while rests are rural settlements. Among them, Uttar

Table 6.5: Block wise Distribution of Central Places of Hierarchic Order

Malda District

(2001)

Name of the Block	Total Inhabited Settlements	Hierarchic Order of Central Places					
		First Order (<236.09)	Second Order (236.09-788.09)	Third Order (788.90-1341.71)	Fourth Order (1341.71-1894.52)	Fifth Order (1894.52-2447.33)	Sixth Order (>2447.33)
1. Harishchandrapur-I	104	20	02	01	01	-	-
2. Harishchandrapur-II	72	15	06	-	-	-	-
3. Chanchal-I	99	22	05	-	-	01	-
4. Chanchal-II	88	18	04	-	-	-	-
5. Ratua-I	91	19	04	01	01	-	-
6. Ratua-II	48	22	04	-	-	-	-
7. Gazole	288	33	05	02	-	-	-
8. Bamangola	141	15	03	01	-	-	-
9. Habibpur	233	13	07	01	-	-	-
10. Old Malda	115	11	03	-	01	-	-
11. English Bazar	113	21	07	-	-	-	01
12. Manikchak	72	20	04	01	-	-	-
13. Kaliachak-I	61	19	06	02	-	-	-
14. Kaliachak-II	55	15	04	01	-	-	-
15. Kaliachak-III	66	11	07	01	-	-	-
Malda district	1646	274	71	11	03	01	01

Note: Figure in brackets refer to the range of centrality score of central places.

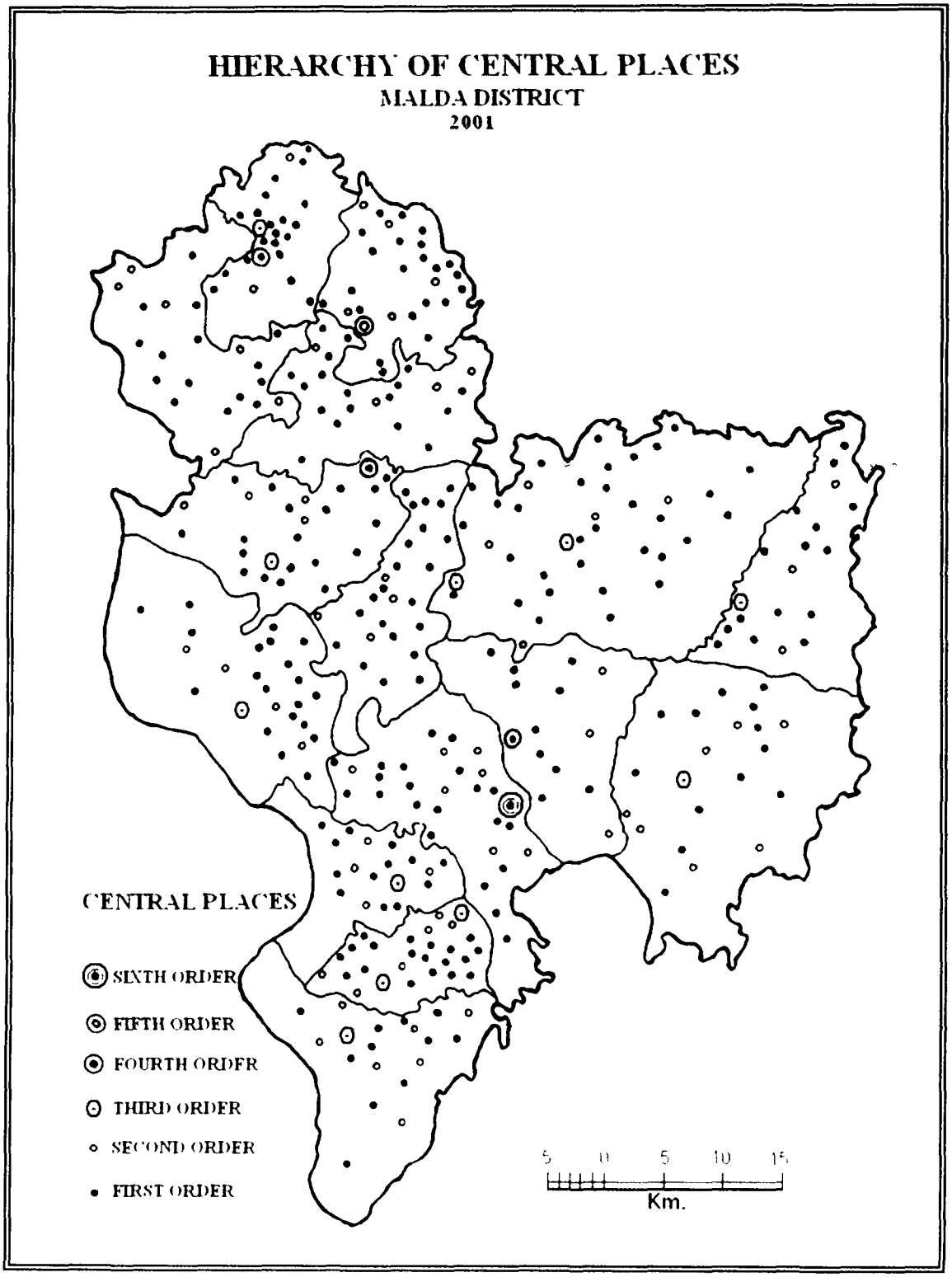
HIERARCHY OF CENTRAL PLACES
MALDA DISTRICT
2001
CENTRAL PLACES
SIXTH ORDER
FIFTH ORDER
FOURTH ORDER
THIRD ORDER
SECOND ORDER
FIRST ORDER
5 0 5 10 15
Km.

Fig. 6.3

Harishchandrapur and Old Malda are Block Head Quarters as well as Police Stations. These central places are located at the mean spacing of 37.14 km. (Table 6.4).

Fifth Order Central Place

The lower and upper limit of the fifth order central place is the centrality score of 1894.52 and 2447.33 respectively (Table 6.4). Singia in Chanchal-I block is the single central place with centrality score 2339.72 comes under this hierarchic order inhabiting total population 10,051 persons. It provides the higher order facilities like Sub Division Office, Block Head Quarter, and Police Station, College etc. to the dependent population (i.e., population of its own and surrounding settlements). But Singia is not an urban centre as per census of India 2001.

Sixth Order Central Place

English Bazar, the District Head Quarter, is single settlement accounted for the highest order i.e., sixth order central place attaining the centrality score 9381.72 (Fig. 6.3). It provides both higher and lower order functions and being district head have complete control over the district administrative boundary. Total population of English Bazar accounts 161,456 persons (App. IV).

Relationship between Centrality Score and total Population of Central Place

On the basis of Karl Pearson's technique of coefficient of correlation the hypothesis, centrality score of central places is directly correlated to its population, has been tested. To examine the causal relationship between centrality score being the 'X' i.e., independent variable and the total population being 'Y' i.e., dependent variable, 361 central places of the district have been taken into consideration. The analysis reveals that both the variables are positively correlated with r value 0.867. Their correlation is significant at 1 percent level at 359 degree of freedom (d.f.). Therefore, it may be ascertained that the central places with higher centrality score have attained higher population and vice-versa. The computed equation, $y = 1.3809x + 4542.1$ gives the best fit regression line to determine the linear relationship between centrality score and population of the central places (Fig. 6.4).

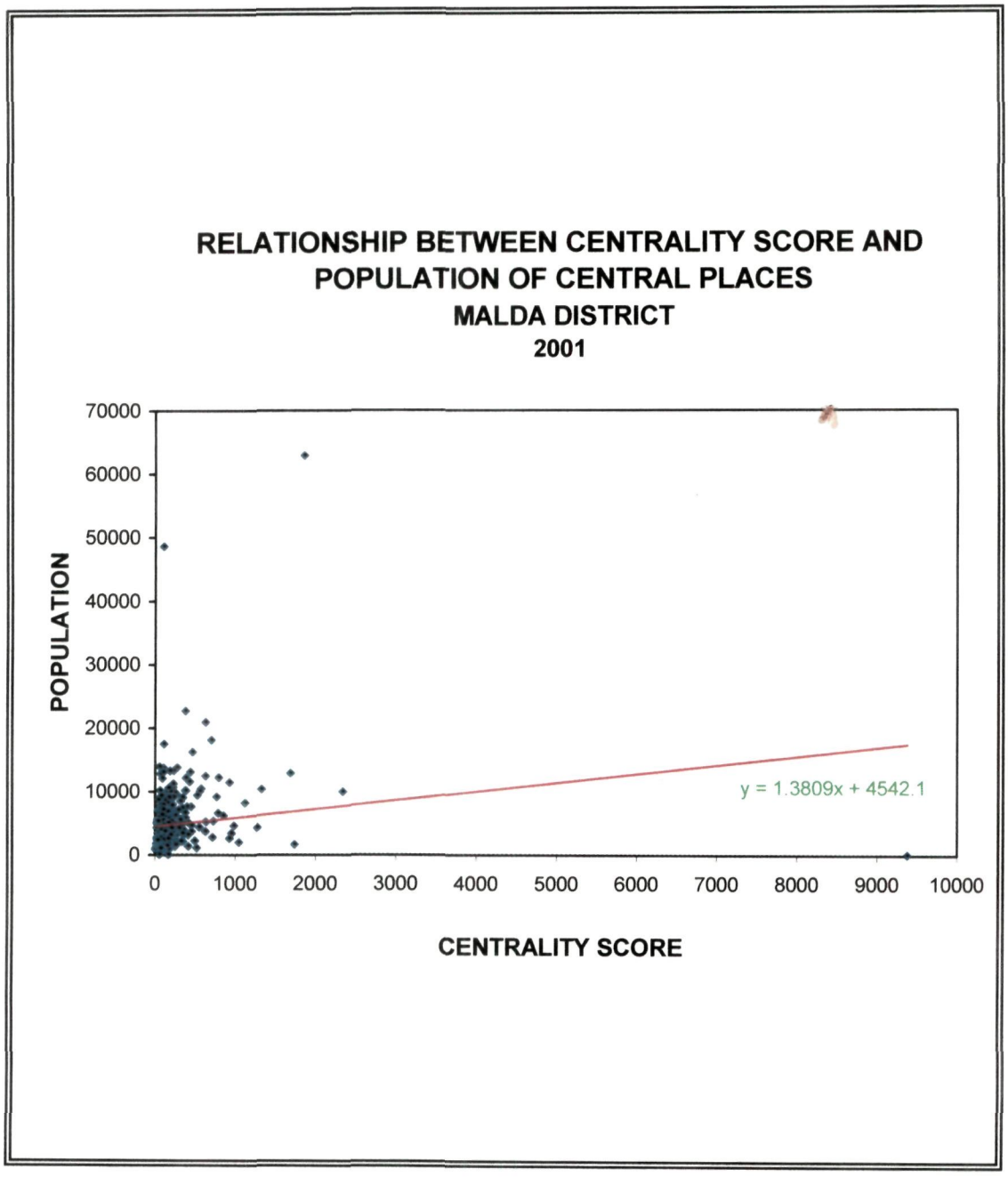
RELATIONSHIP BETWEEN CENTRALITY SCORE AND
POPULATION OF CENTRAL PLACES
MALDA DISTRICT
2001
POPULATION
70000
60000
50000
40000
30000
20000
10000
0
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
y = 1.3809x + 4542.1
CENTRALITY SCORE

Fig. 6.4

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CHAPTER - 7

SPATIAL INTERACTION AND ORGANISATION OF CENTRAL PLACES

SPATIAL INTERACTION AND ORGANISATION OF CENTRAL PLACES

Each central place covers certain area upon which it interacts. Central place provides services and functions to the people of surrounding settlements while the people of dependent settlements offer demand for the goods and services. In this way an interaction pattern is emerged between central place and its surrounding area. The area upon which the central place exerts influence is referred to as zone of influence or complementary region or hinterland or service area of the central place. Thus in spatial context, the area from where people interact with the particular focal point (central place) is known as the service area of the central place. The zone of influence or service area is the product of centrality score of the central place.[1] However, spatial organization is the outcome of spatial interaction of people with central place. The delineation of service area of central place involves the estimation of population and area depends on it. It is concerned with the study of consumers traveling pattern and their preference for a central place.

For such investigation Harishchandrapur–II block of the district has been taken as a case study. After rigorous analysis regarding the distribution of facility and levels of development, it has been observed that Harishchandrapur-II block is least developed block in the study area in terms of availability, accessibility and potential utilisation of existing amenities and socio-economic facilities. Keeping in view these inherent qualities found in the block, it has been selected as a unit for the formulation of diagnostic planning to achieve balanced regional development so that it may serve as a pragmatic model for all those areas which are cognizance with the area of the formulated model in order to bring the whole region at par with highly developed region.

Before assessing the spatial interaction and organisation of central places it is essential to analyse the pattern of spatial distribution of settlements and socio-economic facilities and also to examine the extent of regional disparities in socio-economic development at micro-level in the case study block.

7.1 SPATIAL ANALYSIS OF SETTLEMENTS, FACILITIES AND LEVELS OF SOCIO-ECONOMIC DEVELOPMENT IN HARISHCHANDRAPUR –II BLOCK

Harishchandrapur-II block is located in the north of the Malda district, at 55 km. linear distance and about 82 km. road distance from English Bazar i.e., district headquarter (approximate distance between block and district headquarters). It is one of the remotest blocks in the district. It has 09 Gram Panchayats* i.e., Sultan Nagar, Malior-1, Malior-2, Sadlichak, Daulat Nagar, Islam Pur, Bhaluka, Mashaldaha and Daulat Pur (Fig. 7.1).

It covers an area of 217.2 sq. km. i.e., 6.1 per cent of total geographical area of Malda district. The block is entirely rural area consisting of 72 inhabited and 02 uninhabited settlements (Fig. 7.1). It has total population of 198,039 persons i.e., 6.02 per cent population of the district, of which 102,066 persons (51.54%) are males and 95,973 persons (48.46%) are females.[2] Agriculture is the main source of livelihood of the people as no one industry is found in the block. The main sources of irrigation are shallow tube wells, pump sets and river lift irrigation. As per statistics 2000-01, 16,915 hectares of area has been reported as Net Cropped Area (NCA) and 33,430 hectares Grossed Cropped Area (GCA). Rice is a dominant crop cultivated in 81.45 per cent of GCA in the block, followed by Wheat (07.33% of GCA), Mustard (07.09% of GCA) and Pulses (1.50% of GCA).

7.1.1 SPATIAL ORGANISATION OF SETTLEMENTS

Spatial organisation of has been analysed in terms of their distribution, size, spacing and dispersion.

Distribution of Settlements

Distribution of settlements has been examined in terms of their density, area and population considering Gram Panchayat (GP) as the unit of study. Table 7.1 and Figure 7.2 reveals that highest 22.22 per cent of settlements have been recorded in Sultan

* In northern India for administrative convenience block is further divided into different Nayapanchayat and each Nayapanchayat has almost eight villages and each village has its definite administrative boundary. In Malda district, block is divided into Gram Panchayat instead of Nayapanchayat and each Gram Panchayat consists of average eight villages. The difference lies only in nomenclature not purpose.

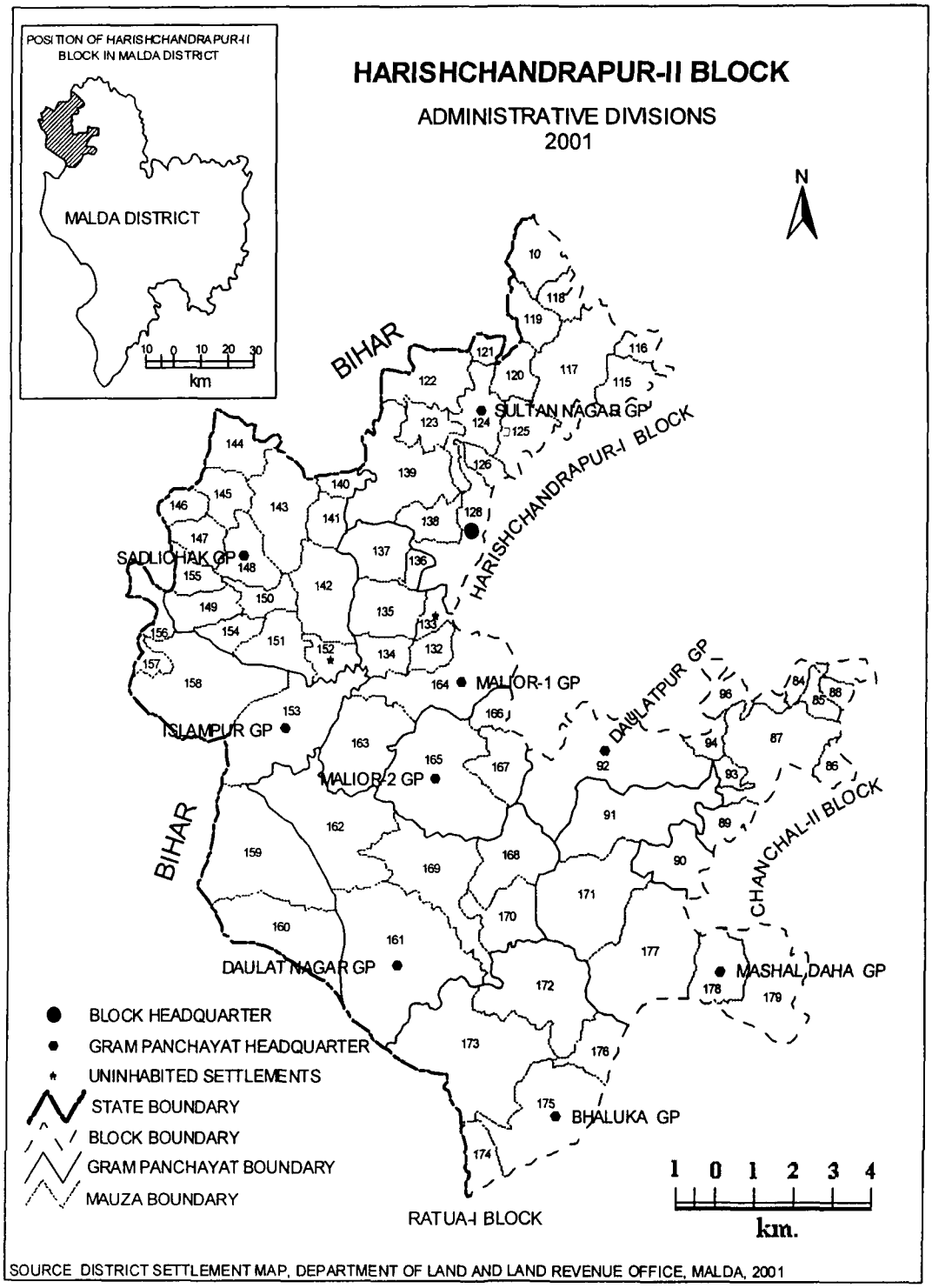
POSITION OF HARISHCHANDRAPUR-II BLOCK IN MALDA DISTRICT
MALDA DISTRICT
10 0 10 20 30
km
HARISHCHANDRAPUR-II BLOCK
ADMINISTRATIVE DIVISIONS
2001
N
BIHAR
SULTAN NAGAR GP
HARISHCHANDRAPUR-I BLOCK
SADLICHAK GP
MALIOR-1 GP
DAULATPUR GP
ISLAMPUR GP
MALIOR-2 GP
CHANCHAL-II BLOCK
DAULAT NAGAR GP
MASHAL DAHA GP
BHALUKA GP
RATUA-I BLOCK
BLOCK HEADQUARTER
GRAM PANCHAYAT HEADQUARTER
UNINHABITED SETTLEMENTS
STATE BOUNDARY
BLOCK BOUNDARY
GRAM PANCHAYAT BOUNDARY
MAUZA BOUNDARY
1 0 1 2 3 4
km.
SOURCE DISTRICT SETTLEMENT MAP, DEPARTMENT OF LAND AND LAND REVENUE OFFICE, MALDA, 2001

Fig. 7.1

Sl. No.	J.L. No.	Name of the Settlement	Sl. No.	J.L. No.	Name of the Settlement
SULTAN NAGAR GRAM PANCHAYAT			39.	151	Suriyapura Tengura
1.	010	Jayrampur	40.	152	Dakshin Kumedpur *
2.	115	Chhatrak	41.	154	Sikatani Inlis
3.	116	Hulaspur	42.	155	Bhuna
4.	117	Monaharpur	**DAULAT NAGAR GRAM PANCHAYAT**		
5.	118	Bildaha	43.	161	Daulat Nagar
6.	119	Saranpur	44.	162	Mihaghat
7.	120	Sayra	45.	168	Hardam Nagar
8.	121	Kushol	46.	169	Talbangrua
9.	122	Chaksatan	47.	170	Bhairabpur
10.	123	Dahara	**ISLAMPUR GRAM PANCHAYAT**		
11.	124	Sultan Nagar	48.	153	Talbhakuria
12.	125	Darol	49.	156	Nawapara
13.	126	Dakshin Mukundapur	50.	157	Degree Inlis
14.	128	Khanta	51.	158	Khopakati
15.	138	Sahapur	52.	159	Uttar Bhakuria
16.	139	Datian	53.	160	Dakshin Bhakuria
MALIOR – I GRAM PANCHAYAT			**BHALUKA GRAM PANCHAYAT**		
17.	132	Samukha	54.	172	Jagannathpur
18.	133	Chonchpara *	55.	173	Fatepur
19.	134	Tetia	56.	174	Par Bhaluka
20.	135	Arjuna	57.	175	Bhaluka
21.	136	Raghabpur	58.	176	Degun
22.	138	Basant Dhanipura	**MASHALDAHA GRAM PANCHAYAT**		
23.	163	Belsur	59.	091	Malipakar
24.	164	Malior	60.	171	Talgachhi
MALIOR – II GRAM PANCHAYAT			61.	177	Kariali
25.	165	Talsur	62.	178	Mashaldaha
26.	166	Jalalpur	63.	179	Mohanpur
27.	167	Dakshin Gouripur	**DAULATPUR GRAM PANCHAYAT**		
SADLICHAK GRAM PANCHAYAT			64.	084	Ilam Malik
28.	140	Putia	65.	085	Ilam
29.	141	Kankani	66.	086	Maslandapur
30.	142	Uttar Kumedpur	67.	087	Bejpura
31.	143	Talgram	68.	088	Uttar Bejpura
32.	144	Hariharpur	69.	089	Latasi
33.	145	Betahal	70.	090	Gaushpur
34.	146	Sahara Bahara	71.	092	Daulatpur
35.	147	Maharapara	72.	093	Dubol
36.	148	Sadlichak	73.	094	Bansdol
37.	149	Sikatani	74.	096	Chithalia
38.	150	Basudebpur			

* Uninhabited Settlements.

Table 7.1: Gram Panchayat wise Distribution of Settlements and population
Harishchandrapur-II Block
(2001)

Name of the Gram Panchayat	Settlements		Density of Settlements (Sett/10 sq.km.)	Average Space of Settlements (sq. km.)	Population	
	No.	%			No.	%
1.Sultan Nagar	16	22.22	4.59	2.18	30,568	15.44
2.Malior-1	7	9.72	3.83	2.61	19,420	9.81
3.Malior-2	3	4.17	2.63	3.80	12,866	6.50
4.Sadlichak	14	19.44	5.70	1.76	22,934	11.58
5.Daulat Nagar	5	6.94	1.77	5.64	26,530	13.40
6.Islam Pur	6	8.33	2.10	4.75	17,093	8.63
7.Bhaluka	5	6.94	2.20	4.55	21,497	10.85
8.Mashaldaha	5	6.94	2.08	4.80	25,850	13.05
9.Daulat Pur	11	15.28	4.46	2.24	21,281	10.75
Harishchandrapur-II Block	72	100	3.3	3.02	198,039	100

Source: Computed from District Census Hand Book, Village Directory, 2001.

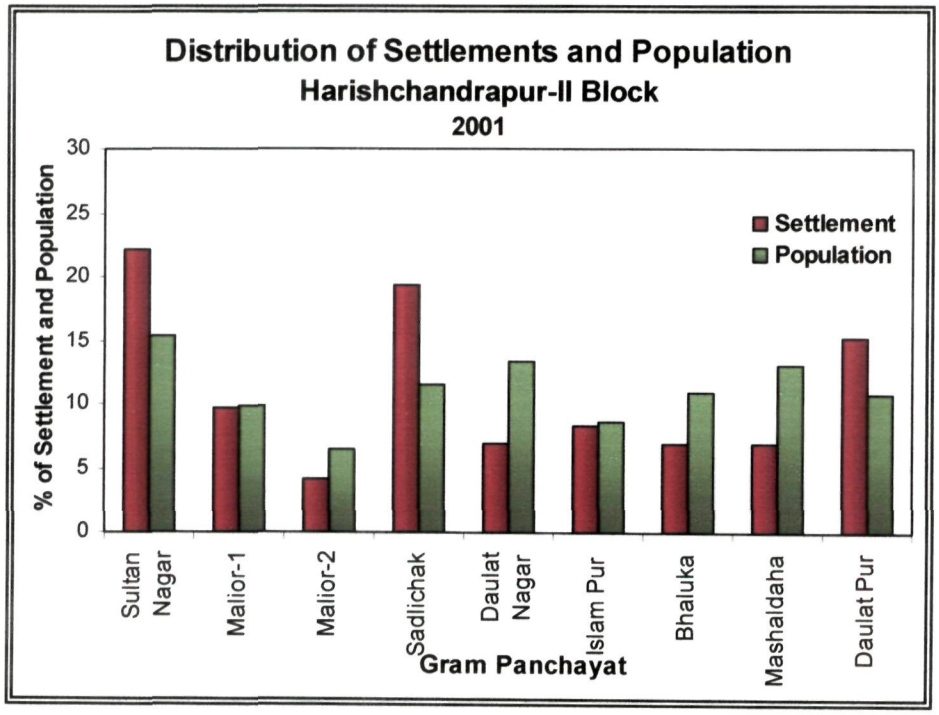

Fig. 7.2

Nagar gram panchayat, followed by Sadlichak (19.44%) and Daulat Pur (15.28%) while Malior-2 gram panchayat accounts lowest 4.17 per cent of settlements of the block. Highest and lowest per cent of population of the block is accommodated in Sultan Nagar i.e., 15.44 per cent and Malior-2 i.e., 6.50 per cent respectively (Fig.7.2). It is exhibited that though Daulat Nagar gram panchayat accounts 6.94 per cent of the settlements but provides accommodation to 13.40 percent of population of the block. Same table (Table 7.1) further reveals that highest density of settlements i.e., 5.70 per 10 sq. km. has been recorded in Sadlichak gram panchayat which has registered lowest average space size of each settlement i.e., 1.76 sq. km., however Daulat Nagar accounts lowest density i.e., 1.77 but highest average space size of settlements i.e., 5.64 sq. km. in the block. It is clear that both density (sett./10sq. km.) and average space size (sq. km.) of settlements are inversely related to each other.

Table 7.2: Distribution of Settlements and Population among Size Group of Settlements

Harishchandrapur-II Block

(2001)

Population size-group (persons)	Settlements			Population		
	No.	Per cent	Cumulative Percentage	No.	Per cent	Cumulative Percentage
Below 250	02	2.78	2.78	333	0.17	0.17
250-499	05	6.94	9.72	1784	0.90	1.07
500-999	13	18.06	27.78	9394	4.74	5.81
1000-1999	18	25.00	52.78	24847	12.55	18.36
2000-4999	20	27.78	80.56	65596	33.12	51.48
5000-9999	14	19.44	100.00	96085	48.52	100.00
10000 & Above	0	0	100.00	0	0	100.00
Total	72	100	100	198,039	100	100

Source: Computed from District Census Hand Book, Village Directory, 2001.

Table 7.2 exhibits the distribution of settlements and population among the size group of settlements. Not a single settlement having population 10,000 persons and above has been recorded in Harishchandrapur-II block. Highest i.e., 27.78 per cent of the settlements have been accounted in the size group 2000-4999 persons which contain 33.12 per cent of total population of the block. However, 27.78 per cent of settlements having population less than 1000 in each accommodate 5.81 per cent of total population

of the block. Figure 7.3 reveals the cumulative frequency distribution of settlements and population among different size group of settlements in the block. Both frequency curves are not corresponds to each other which reveals somewhat disproportional distribution of population among the size group of settlements (Fig. 7.3).

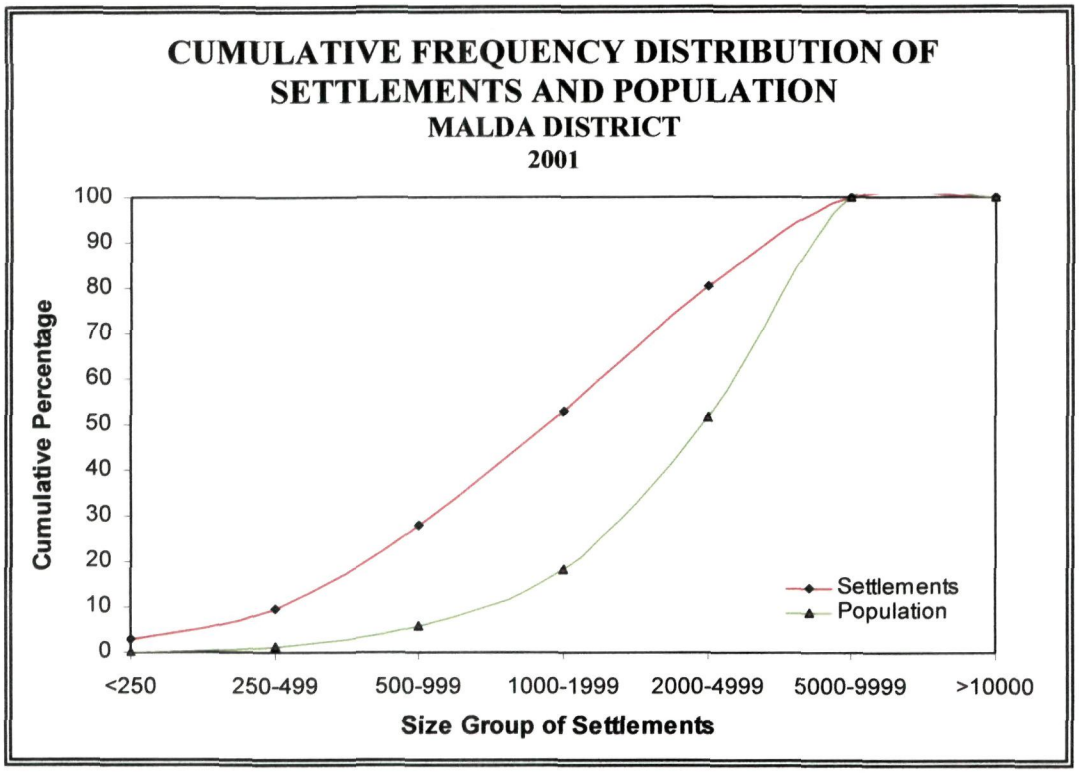

Fig. 7.3

Spacing of settlements

On the basis of Mather's model, mean spacing of settlements has been examined at Gram Panchayat level. Table 7.3 reveals that highest mean spacing of settlements i.e., 2.55 km. has been recorded in Daulat Nagar followed by Mashaldaha (2.354 km.), however Sadlichak registered lowest mean spacing i.e., 1.423 km. followed by Sultan Nagar gram panchayat (1.585). Inter settlement spacing is directly correlated with the size of settlements as the spacing increases the size of settlements tends to increase and vice versa.

Dispersion of Settlements

Dispersion of settlements is closely related to the spacing and constitutes as one of the basis for the classification of settlements into different types. There are many statistical techniques for the measurement of the degree of dispersion, most popular one is the 'Nearest Neighbour Index' (N-N Index=Rn).[3] Nearest Neighbour analysis is used to measure the actual point pattern against a clustered, a random and a uniform pattern. In this analysis it is assumed that, points (settlements) are distributed randomly in influenced by that of other points or settlements. Thus the dispersion may be defined as the degree of deviation of set of points from random relative to some delimited area.[4]

Table 7.3: Mean Spacing and Dispersion of Settlements
Harishchandrapur-II Block
(2001)

Name of the Gram Panchayat	Mean spacing (km)of settlements	Rn Index of Settlements	Pattern of settlements distribution
1.Sultan Nagar	1.585	1.603	Random
2.Malior-1	1.736	1.541	Random
3.Malior-2	2.094	1.598	Random
4.Sadlichak	1.423	1.692	Random
5.Daulat Nagar	2.55	1.760	Random
6.Islam Pur	2.343	1.609	Random
7.Bhaluka	2.292	1.979	Random
8.Mashaldaha	2.354	1.311	Random
9.Daulat Pur	1.609	1.673	Random
Harishchandrapur-II	1.866	1.584	Random

Source: Computed by author.

For the analysis of spatial distribution of settlements in the block, Gram Panchayat has been considered as the unit of study for comprehending the underlying variance in physico-cultural and socio-economic factors affecting the spatial organization, areal association and areal differentiation of the settlements. The measurement of dispersion by computing the value of N-N Index (Fig.7.4) reveals the random pattern of the settlements (Rn = 1.584) at block level (App. IV) but at Gram Panchayat level differences in the indices of Rn value are more apparent ranging from

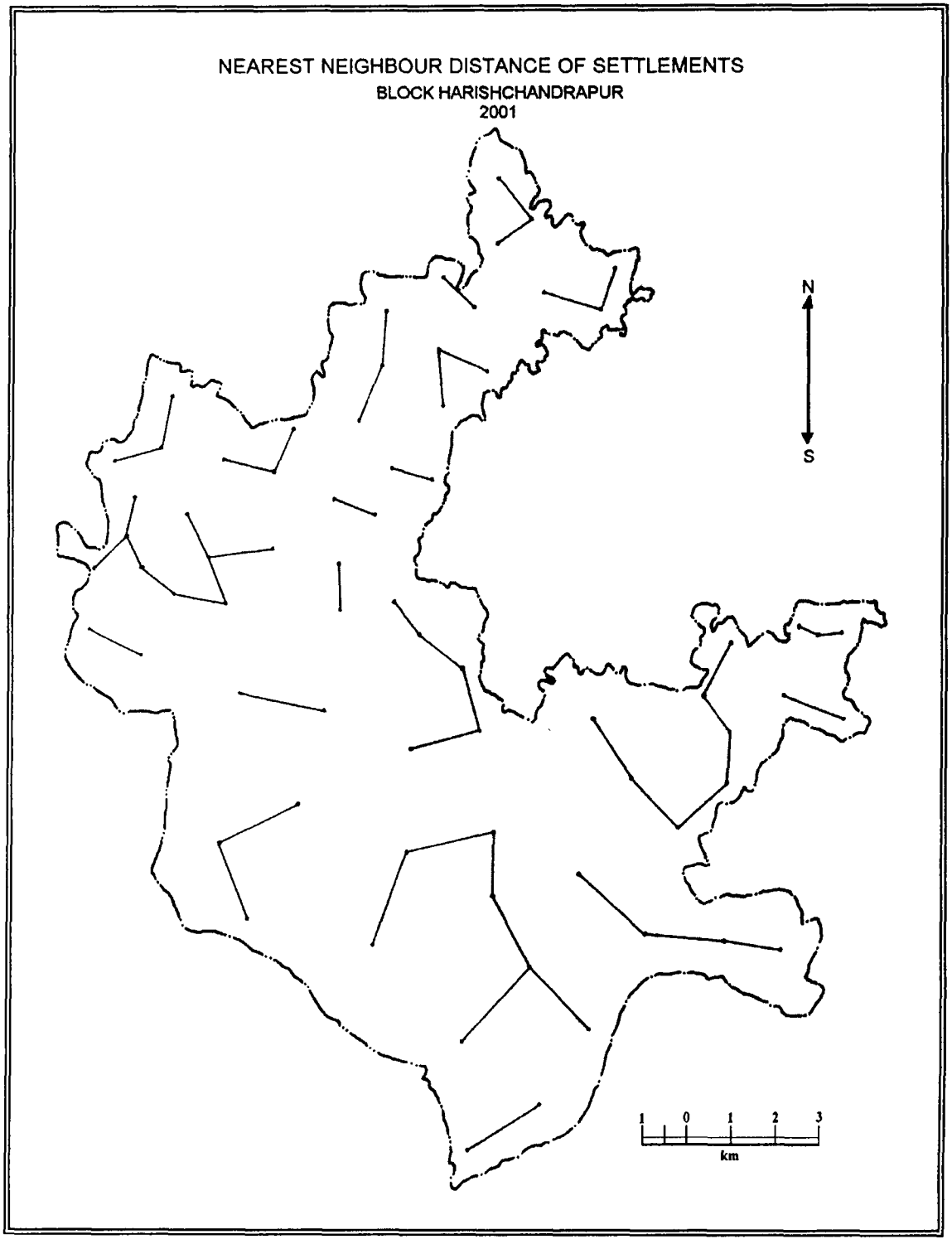
NEAREST NEIGHBOUR DISTANCE OF SETTLEMENTS
BLOCK HARISHCHANDRAPUR
2001
N
S
1 0 1 2 3
km

Fig. 7.4

1.311 to 1.979 revealing approaching uniform pattern of distribution of settlements (Table 7.3).

7.1.2 SPATIAL ANALYSIS OF SOCIO-ECONOMIC FACILITIES

Out of 41 amenities and facilities that have been taken under study at district level, only 26 are found in the block. Spatial analysis of existing facilities is based on the standard statistical techniques i.e., Mather's model of mean spacing and Gini's Coefficient of Concentration. The numeric analysis of their distribution is given in Table 7.4.

Table 7.4 reveals that Primary School is closely located to each other with mean spacing 2.16 km. of the settlements having it. In the block 96 primary schools are distributed among 54 inhabited settlements which provide primary education facility to the average population of 2,062 persons. As per Gini's concentration ratio of 0.16, it is quite uniformly distributed among all the size group of settlements. Only two Higher Secondary Schools are located in the block serving to the average population of 99,020 persons. It is located at the mean spacing of 11.20 km. in against mean spacing 9.81 km. in the district. Gi value 0.57 in the case study area is lesser than that of at district level i.e., 0.740 has been accounted in the distribution of HS due to its higher concentration at bigger size settlements in later than the former. The block does not have Degree College and Training Institute facility.

Only two types of medical facility i.e., three Primary Health Centres and two Dispensaries facilitates to the people of Harishchandrapur – II block and they are located at the mean spacing of 9.14 km. and 11.20 km. respectively. Gini's ratio of 0.5 (PHC) and 0.54 (Dis.) reveals that both facilities are quite disproportionately distributed among medium to bigger size settlements in the block.

Table 7.4 further reveals that total 21 Branch Post Offices are distributed in 21 inhabited settlements facilitating to the average population of 9,430 persons in the block. The settlements having BPO are located at the mean spacing of 3.46 km. which are medium and bigger size defined by the Gi value 0.51. As many as 35 settlements of the block are having Telephone facility located at the mean spacing of 2.68 km.. Gini's ratio

of 0.25 reveals that they are approaching to uniformly distributed among all size group of settlements.

In the block, 10 settlements have Fare Bus Stop, 03 settlements have Railway Station and 24 settlements have Pucca Road facility with their mean spacing 5.01 km., 9.14 km. and 3.23 km. respectively. 4.78 is the mean spacing of settlements at which the

Table 7.4: Spatial Distribution of Socio-Economic Facilities
Harishchandrapur – II Block
(2001)

Sl. No.	Name of the Facility	No. of facility	settlements having facility	Average population per facility	Mean spacing (in km.) of settlements having facility	Gi value of settlements having facility
1.	PS	96	54	2,062	2.16	0.16
2.	MS	18	17	11,002	3.84	0.5
3.	SS	10	09	19,804	5.28	0.54
4.	HS	02	02	99,020	11.20	0.57
5.	PHC	03	03	66,013	9.14	0.5
6.	Dis.	02	02	99,020	11.20	0.54
7.	BPO	21	21	9,430	3.46	0.51
8.	Tel.	-	35*	5,658**	2.68	0.25
9.	FBS	10	10	19,804	5.01	0.46
10.	RWS	03	03	66,013	9.14	0.3
11.	PR	-	24*	8,252**	3.23	0.3
12.	DM	01	01	198,039	15.84	0.81
13.	PM	11	11	18,004	4.78	0.54
14.	EDP	-	58*	3,414**	2.08	0.1
15.	TW	-	06*	33,006**	6.47	0.24
16.	EA	-	58*	3,414**	2.08	0.1
17.	ASDC	07	06	28,291	6.47	0.6
18.	FDC	46	13	4,305	4.39	0.47
19.	ACS	10	10	19,804	5.01	0.47
20.	CB	03	03	66,013	9.14	0.49
21.	BAHC	01	01	198,039	15.84	0.81
22.	ABHC	01	01	198,039	15.84	0.80
23.	BHQ	01	01	198,039	15.84	0.20
24.	PL	05	05	39,608	7.08	0.33
25.	FRR	05	05	39,608	7.08	0.33
26.	Cin.	01	01	198,039	15.84	0.33

Source: Computed by author.
Note: * Number of settlements having facility.
** Population per settlement having facility.

settlements having periodic markets are located apart from each other. Gi value 0.54 reveals that it is quite disproportionately distributed among the size group of settlements. Each PM serves to 18,004 person average populations (Table 7.4). The distribution of both facilities i.e., Electricity for Domestic Purpose and Electricity for Agriculture shows approaching uniform pattern with their Gini's ratio 0.12, however 58 settlements having each facility is located at the mean spacing of 2.08 km. (Table 7.4).

Total 03 Commercial Banks are distributed in 03 settlements, serving an average population of 66,013 persons in the block. Each CB is located at the mean spacing of 9.14 km. (Table 7.4). However, 07 Agricultural Seed Distribution Centres, 46 Fertilizer Distribution Centres and 10 Agricultural Credit Societies are distributed among 06 settlements, 13 settlements and 10 settlements respectively. Settlements having these facilities are located at the mean spacing of 6.47 km. 4.39 km. and 5.01 km. respectively. Each of the facilities i.e., Public Library and Free Reading Rooms accounts for 05 serving to an average population of 39,608 persons in the case study block. Each of them is located at the mean spacing of 7.08 km. while Gi value 0.33 reveals that they are not much disproportionately concentrated at only bigger size settlements rather somewhat proportional among the size group of settlements (Table 7.4).

It is exhibited from Table 7.4 that the block has one unit of each Daily Market located in Uttar Kumedpur (J.L.No.142), Block Animal Health Centre in Bhaluka (J.L.No.175), Additional Block Animal Health Centre in Daulatpur (J.L.No.078), Block Head Quarter in Khanta (J.L.No.128) and Cinema Talkies in Uttar Kumedpur (J.L.No.142).

7.1.3 LEVELS OF SOCIO-ECONOMIC DEVELOPMENT

In the case study block i.e., Harishchandrapur-II, regional disparities in the levels of socio-economic development has been examined at Gram Panchayat level. Twenty five socio-economic variables have been taken for the analysis are, number of primary school per 1,000 persons (X_1), middle school per 1,000 persons (X_2), secondary school per 1,000 persons (X_3), higher secondary school per 1,000 persons (X_4), primary health centre per 1,000 persons (X_5), dispensary per 1,000 persons (X_6),

Table 7.5: Z-Score of each Socio-Economic Variable

Harishchandrapur-II Block

(2001)

Name of the Gram Panchayat	Values of Z - score												
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}
1. Sultan Nagar	-0.8	-0.47	-0.38	-0.53	-0.67	1.0	-1.59	-0.08	-0.73	-0.55	-0.72	-1.39	-0.37
2. Malior-1	-1.0	2.16	2.17	2.11	-0.67	-0.5	0.84	0.53	-0.73	-0.55	-0.91	-0.17	-0.37
3. Malior-2	1.8	-1.53	-1.02	-0.53	-0.67	-0.5	1.11	-2.18	-0.73	-0.55	-1.45	0.56	-0.37
4. Sadlichak	0.93	0.05	-0.17	-0.53	-0.67	-0.5	-0.78	1.2	-0.73	1.88	-0.91	-0.41	-0.37
5. Daulat Nagar	-0.67	1.11	0.68	-0.53	1.24	-0.5	0.84	0.68	0.18	-0.55	0.09	0.32	-0.37
6. Islampur	0.87	-0.47	-1.02	-0.53	-0.67	2.5	-1.59	-0.61	-0.73	-0.55	1.13	-1.39	-0.37
7. Bhaluka	0	-0.65	-1.02	-0.53	1.71	-0.5	0.57	1.2	2.23	-0.55	1.63	-0.17	2.75
8. Mashaldaha	-1.03	-0.12	0.68	1.58	1.24	-0.5	0.03	1.2	1.09	1.08	0.86	0.56	-0.37
9. Daulatpur	0.07	0.05	0.04	-0.53	-0.67	-0.5	0.57	-0.89	0.18	-0.55	0.28	2.02	-0.38

Contd.....

(Contd. Table 7.5)

Name of the Gram Panchayat	Values of Z - Score												Composite Mean Z-Score	Rank in Scoio-Economic Development
	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	X_{25}		
1. Sultan Nagar	-1.38	1.27	-2.38	-4.11	-0.50	-0.56	1.06	-0.77	-0.77	-0.31	-0.37	-0.37	-0.66	9
2. Malior-1	-0.78	-0.51	0.69	-0.81	0.02	-0.05	-0.71	-0.77	-0.77	-0.31	-0.37	-0.37	-0.07	6
3. Malior-2	-1.05	-0.51	-0.95	-0.81	-0.86	-1.33	-0.71	-0.77	0.77	-0.31	-0.37	-0.37	-0.59	8
4. Sadlichak	0.22	-0.51	0.32	2.53	2.55	0.97	-0.71	0.52	0.52	2.77	-0.37	-0.37	0.29	4
5. Daulat Nagar	1.15	-0.51	0.69	0.03	-0.42	-1.33	1.65	-0.77	-0.77	-0.31	-0.37	-0.37	0.05	5
6. Islampur	0.22	-0.51	-0.31	-0.81	-0.86	1.74	-0.71	-0.77	-0.71	-0.31	-0.37	-0.37	-0.29	7
7. Bhaluka	1.15	2.34	0.69	0.31	-0.09	-0.05	-0.71	0.84	0.84	-0.31	2.75	-0.37	0.56	1
8. Mashaldaha	1.15	-0.31	0.69	-0.61	-0.02	-0.21	1.65	0.52	0.52	-0.31	-0.37	-0.37	0.35	2
9. Daulatpur	0.55	-0.51	0.69	0.31	0.59	0.97	-0.71	2.13	2.13	-0.31	-0.37	2.75	0.32	3

Source: Computed from District Census Hand Book, Village Directory, 2001.

branch post office per 1,000 persons (X_7), settlements having telephone facility to total settlements (X_8), fare bus stop per sq.km. area (X_9), railway station per sq.km. area (X_{10}), settlements having pucca road to total settlements (X_{11}), periodic market per 1,000 persons (X_{12}), daily market per 1,000 persons (X_{13}), settlements having electricity for domestic purpose to total settlements (X_{14}), settlements having tap water facility to total settlements (X_{15}), settlements having electricity for agriculture to total settlements (X_{16}), agricultural seed distribution centre per hectare of net cropped area (X_{17}), fertilizer distribution centre per hectare of net cropped area (X_{18}), agricultural credit society per 1,000 persons (X_{19}), commercial bank per 1,000 persons (X_{20}), public library per 1,000 persons (X_{21}), free reading room per 1,000 persons (X_{22}), cinema talkies per 1,000 persons (X_{23}), block animal health centre per 1,000 persons (X_{24}), and additional block animal health centre per 1,000 persons (X_{25}).

Table 7.6: Levels of Socio-Economic Development
Harishchandrapur-II Block
(2001)

Levels of Development	Composite Mean Z-Score	Number of Gram Panchayat	Name of the Gram Panchayat
High	Above +0.20	04	Bhaluka, Mashaldaha, Daulatpur and Sadlichak
Medium	-0.21 to +0.20	02	Daulat Nagar and Malior-1
Low	Below –0.21	03	Islampur, Malior-2 and Sultan Nagar

Source: Compiled by author.

On the basis of Z-score technique, the raw data of each variable has got transferred into standard score and their composite mean Z-score has been taken to examine the index of development of each Gram Panchayat. Table 7.5 reveals that, Sultan Nagar is the lowest developed Gram Panchayat having lowest composite mean Z-score of socio-economic development i.e., -0.66 in the block. Table 7.6 and Figure 7.5 depict the levels of socio-economic development in the block.

High Level of Socio-Economic Development (> +0.20)

Table 7.6 and Figure 7.5 reveal that, four GPs i.e., Bhaluka (0.56), Mashaldaha (0.35), Daulatpur (0.32) and Sadlichak (0.29) with composite mean Z-

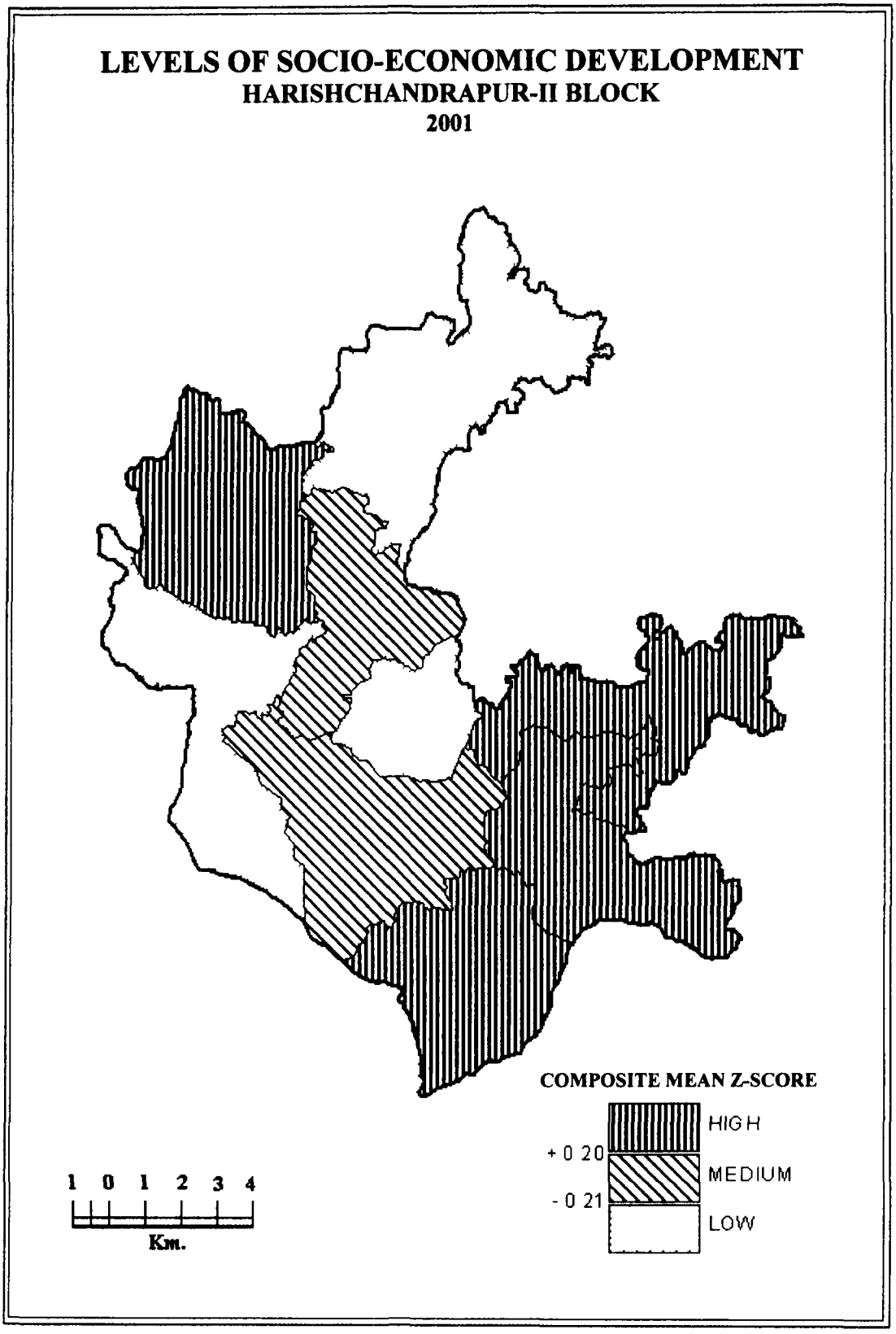
LEVELS OF SOCIO-ECONOMIC DEVELOPMENT
HARISHCHANDRAPUR-II BLOCK
2001
COMPOSITE MEAN Z-SCORE
HIGH
+ 0 20
MEDIUM
- 0 21
LOW
1 0 1 2 3 4
Km.

Fig. 7.5

score more than 0.20 are included in the high level of socio-economic development of the block. Bhaluka GP stood at first rank in the socio-economic development in block Harishchandrapur-II. Sufficient availability of education facility, better transportation and communication and market facility are the causative factors of its high level of development. It covers 44.19 per cent area and contains 46.23 per cent of population of the block.

Medium Level of Socio-Economic Development (-0.21 to +0.20)

It is clear from the Table 7.6 and Figure 7.5 that, two gram panchayats of study block lie under the category of medium level of socio-economic development are Daulat Nagar (0.05) and Malior-I (-0.07) and occupying 21.39 per cent area and 23.20 per cent population of the block respectively.

Low Level of Socio-Economic Development (< -0.21)

Table 7.6 and Figure 7.5 exhibit that, three gram panchayats i.e., Islampur (-0.29), Malior-2 (-0.59) and Sultan Nagar (-0.66) with composite mean Z-score below –0.21 are falling in this group. It covers 34.42 per cent area and contains 30.57 per cent population of the block. Due to political biasness the allocation of developmental facilities is insufficient in these areas. Inadequacy of educational and health facilities, inaccessibility of means of transportation and communication and lack of market facility are among the causative factors of its low level of socio-economic development. People of these gram panchayats have to cover larger distance to avail most of the socio-economic facilities. Though it is not economically viable, socially desirable and environmentally feasible and sustainable, therefore it needs special attention to review the situation for balanced development.

It is observed from foregoing analysis that, a wide regional disparity exists even at block level. Sultan Nagar gram Panchayat has been identified as the lowest developed one in the block. Therefore, allocation of proposed facilities should be begun with the Sultan Nagar gram panchayat.

7.2 DELINEATION OF ZONE OF INFLUENCE

Generally, the delineation of complementary region involves with the segregation of area having homogenous characteristics which is distinguished from

others. Such a region is known as formal region. But in the present study, the delineation of region involves with the demarcation of such an area which exhibits the interaction and interdependence between a central place and its dependent settlements. Such a region is known as functional region. The delineating process of functional region is somewhat complex as its boundary is dynamic subject to dynamic of human needs and desire and development of transportation and communication.[5]

Different scholars have tried to delineate the functional region in order to grouping together the local units which exhibits a considerable degree of interdependence. Green[6] and Carruthers[7] have tried to demarcate the sphere of influence or functional region of a centre taking bus transportation into account. Boudeville[8] delineated functional region taking telephone calls as the flow criteria which exhibits the socio-economic relationship between the centres. Besides, Zipf [9], Reilly[10] and Prakash Rao[11] are among the prominent scholars who have delineated functional region based on probability view of human interaction with the centre. But the methods and techniques used by the scholars are mathematically complex and do not reveals the ground reality of human interaction with a centre, because consumers traveling behaviour is mainly governed by the physiography of land surface, means of transportation and communication, purchasing power of people, human tendency to interact with the centre and their changing needs. Therefore, in the present study, Prakash Rao's modified method has been adopted to delineate the zone of influence of each central place in the pilot study area. This method is easy to calculate and gives an idea about the served and unserved area. Mathematical equation of his model is as follows;

$$S.I. = TCA/C$$

$$R = \sqrt{TCA/C}$$

Where, S.I. = Sphere of influence or service area (in sq.km.)

TC = Total centrality score of central place,

A = Total area (Sq.km) of the study region,

C = Total centrality score of all central places, and

R = Radius of circle indicating the sphere of influence (in km.).

In this method the delineated zone of influence is circular. Larger and smaller circle, therefore, reveals the greater and lesser influence of the central place

respectively. But this method is not as reliable and authentic as empirical observation regarding the actual flow direction to and dependence of people on the respective central place. Therefore, in the present study, the formulation of planning has done on the basis of empirical observation.

7.3 ZONE OF INFLUENCE OF CENTRAL PLACES BASED ON V.L.S. PRAKASH RAO'S MODIFIED METHOD

In the case study block, 15 first order and 06 second order central places have been identified. The zone of influence of each central place has been delineated on the basis of V.L.S. Prakash Rao's modified method. The circle of each central place reveals the area of its influence.

Table 7.7: Sphere of Zone of Influence of the Central Places
Harishchandrapur-II Block
(2001)

Sl. No.	Name of the Central Place	Centrality Score	S.I. = TCA/C (in sq. km.)	$R = \sqrt{TCA/C}$ (in km.)
First Order Central Places				
1.	Gaushpur	62.41	3.82	1.95
2.	Malipakar	39.76	2.44	1.56
3.	Chithalia	66.93	4.10	2.02
4.	Sultan Nagar	174.14	10.67	3.27
5.	Khanta	206.62	12.66	3.56
6.	Basudebpur	46.46	2.85	1.69
7.	Talbhakuria	73.96	4.53	2.13
8.	Daulat Nagar	234.80	14.39	3.79
9.	Mihaghat	95.48	5.85	2.42
10.	Belsur	56.01	3.43	1.85
11.	Malior	180.39	11.06	3.32
12.	Talbangrua	75.43	4.62	2.15
13.	Talgachhi	166.65	10.21	3.19
14.	Jagannathpur	39.07	2.39	1.55
15.	Kariali	166.21	10.19	3.19
Second Order Central Places				
1.	Daulatpur	370.80	22.72	4.77
2.	Uttar Kumedpur	256.57	15.72	3.96
3.	Talgram	236.51	14.49	3.81
4.	Sadlichak	243.62	14.93	3.86
5.	Bhaluka	385.89	23.65	4.86
6.	Mashaldaha	366.40	22.45	4.74
		C=3544.11		

Source: Computed by author, based on Prakash Rao's modified method.

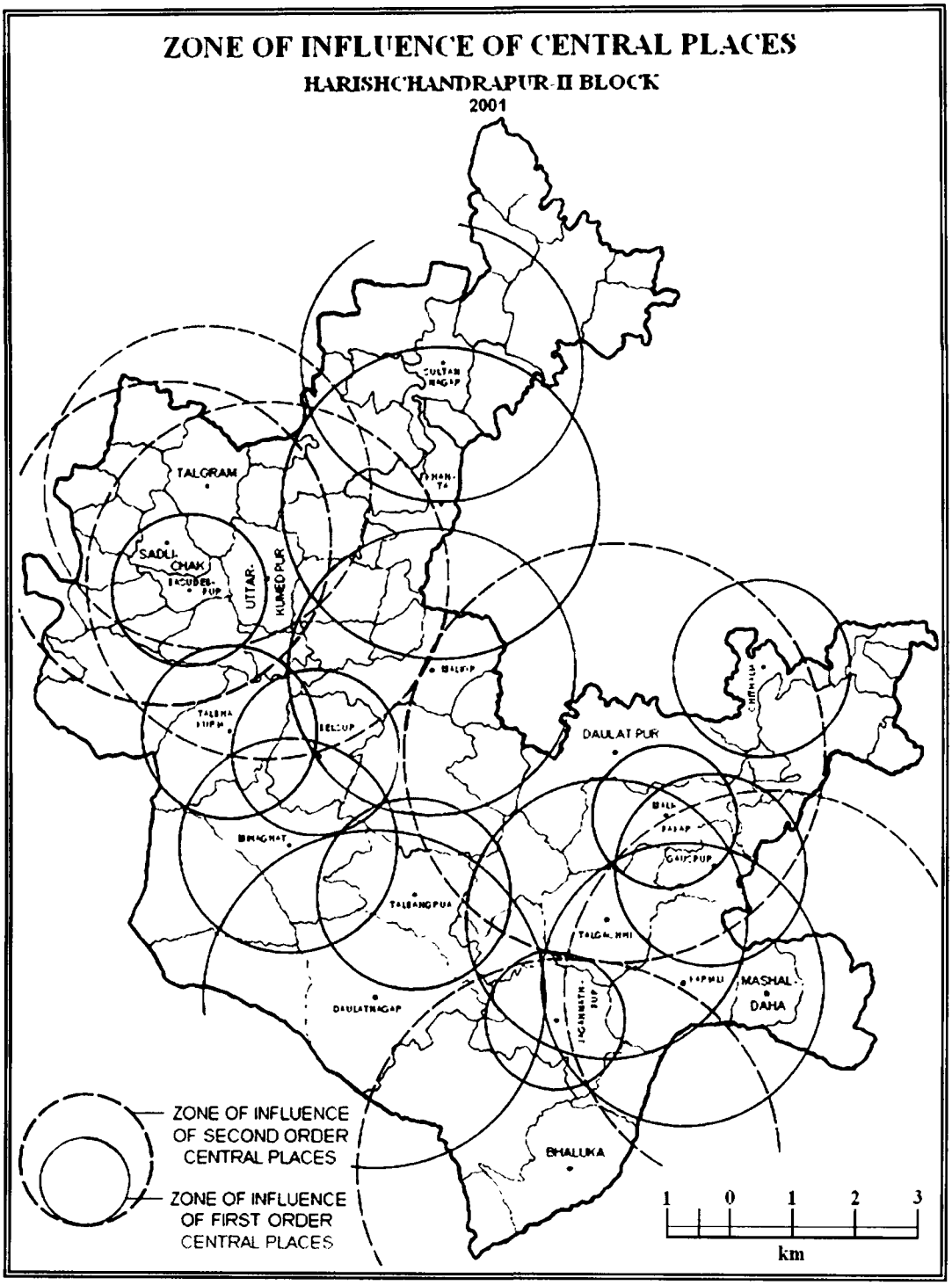
ZONE OF INFLUENCE OF CENTRAL PLACES
HARISHCHANDRAPUR-II BLOCK
2001
TALGRAM
SADLI-CHAK
UTTAR-
DAULAT PUR
MASHAL-DAHA
BHALUKA
ZONE OF INFLUENCE OF SECOND ORDER CENTRAL PLACES
ZONE OF INFLUENCE OF FIRST ORDER CENTRAL PLACES
1 0 1 2 3
km

Fig. 7.6

Table 7.7 exhibits the sphere (in sq.km.) and radius (in km.) of the zone of influence of both first and second order central places. Among the first order central places, Daulat Nagar has highest area i.e., 14.39 sq. km. under its zone of influence, followed by Khanta (12.66 sq.km) and Malior (11.06 sq.km.). Lowest area under the zone of influence i.e., 2.39 sq. km. has been recorded by Jagannathpur. Among the second order central places, highest sphere of zone of influence i.e., 23.65 sq. km. has been recorded by Bhaluka, followed by Daulatpur (22.72 sq.km) while lowest area i.e., 14.49 sq. km. comes under the service area of Talgram (Table 7.7).

Figure 7.6 reveals the zone of influence of both first and second order central places in the block. It is observed that there is a considerable overlapping of zone of influence of central places of both first and second order. Figure 7.6 reveals some basic features of the nesting pattern of the central places in the block are;

i) There is high overlapping of the zone of influence of second order central places in north-western part and south-eastern part of the block due to higher availability of second order facilities here than other areas.

ii) North-eastern part comprising the settlements of Sultan Nagar gram panchayat, south-western part comprising the settlements of Daulat Nagar gram panchayat and eastern part of the block lies out the zone of influence of any second order central place.

iii) There is high overlapping of the zone of influence of first order central places in the central part and south-eastern part comprising the settlements of Daulat Nagar, Islampur, Bhaluka and Mashaldaha gram Panchayats of the block due to higher availability of first order facilities here.

iv) North-eastern part comprising settlements Jayrampur, Bildaha, part of Monaharpur, Chhatrak and Hulaspur of Sultan Nagar gram panchayat, and eastern part comprising settlements Ilam, part of Ilam Malik, Uttar Bejpura, part of Bejpura and Maslandapur of Daulatpur gram panchayat, are neither comes under the zone of influence of first order nor second order central place. It shows the inaccessibility of socio-economic facilities in these areas.

Though the satisfactory result is observed relating to the nesting pattern of zone of influence of central places using the Prakash Rao's modified method, but due

to some drawbacks associated with its circular form, the estimation of dependent area and dependent population become doubtful. Due to difficulty in finding the ground reality, this method is not reliable for the formulation of planning model for regional development. The major drawbacks of this method are;

i) According to this method, the central places make the sphere of zone of influence in circular form but this is not true, it may be any form according to the consumer's preference and physiographic hindrance to reach to particular central place.

ii) In the circular form of service area, there remains a certain gap in between three or more service areas. The gap reveals unserved area, but in real ground no area remains unserved, rather people travel larger distance to avail the facilities.

iii) In this method, it is easy to estimate the dependent area of the central places but it is difficult to estimate the dependent population.

iv) Another problem, in this method one can identify only the unserved areas, but this method can't say, where do the people of unserved area travel to obtain goods and services?

In view of the drawbacks, this method seems to be unauthentic and not more logical than empirical study. For the identification of actual direction of movement of people to the particular central place and for the exact estimation of dependent population, empirical observation is imperative.

7.4 COMPLEMENTARY REGION OF CENTRAL PLACES BASED ON EMPIRICAL OBSERVATION

Due to high authenticity and reliability, empirical observation has been taken as the basis for the delineation of the complementary region of both first order and second order central places for the assessment of the spatial interaction of central places and their dependent settlements. The delineation of complementary region is based on the information relating to consumers traveling behaviour to a respective central place to obtain goods and services at economic distance to fulfill their needs.

On the basis of consumer's traveling pattern, dependent population and area have been estimated to analyse the spatial interaction of central places in the block.

The operational procedures are as follows;

i) Identification of the settlements from where people interact with particular service centre for the fulfillment of their needs of different functions.

ii) People's travel towards particular central place were mapped which enabled to estimate the dependent population and area.

iii) Dependent population of higher order central place have been computed by allotting the lower order centre's dependent population and area to the next higher order with which the people frequently interacts. However, in case a settlement lies at equal distance between two central places and people prefer to go to both the central places, population and area have been distributed equally and added to both of them in estimation of their dependent area and population.

Table 7.8 reveals the dependent settlements of first order and second order central places. The first order central place with its dependent settlements come under the nesting pattern of next higher order i.e., second order central place. Same table (Table 7.8) exhibits that the second order central places firstly make a first order complementary region by providing lower order functions of lower market range, and then make a complementary region of second order. Market range of lower order functions are smaller and make a smaller service area, while higher order functions with higher market range make a larger service area. Therefore, a higher order central place that provides functions of different order firstly makes lower order complementary region and then subsequently higher order complementary region.

In the present analysis, the dependent population and area has been estimated according to the census of India 2001. Dependent population of each central place has also been estimated for 2021 after estimating projected population of each settlement in Harishchandrapur-II block.

7.4.1 Complementary Region of First Order Central Places

Table 7.9 and Figure 7.7 depict the spatial interaction of first order central places. Six central places i.e., Daulatpur, Uttar Kumedpur, Talgram, Sadlichak, Bhaluka and Mashaldaha by virtue are of second order hierarchic, but by providing lower order functions of smaller market range make smaller (first order) service area. In view of the interaction with dependent settlements by providing first order functions, the complementary region of the central places has been delineated at first

order hierarchy and their dependent population and area have been estimated (Fig. 7.7 and Table 7.9).

Table 7.8: Dependent Settlements of Central Places
Harishchandrapur-II Block
(2001)

Second Order Central Places	First Order Central Places	Dependent Settlements
1. Daulatpur	1. Daulatpur	1. Daulatpur and 2. Dakshin Gouripur
	2. Talbangrua	3. Talbangrua, 4. Talsur (part) and 5. Hardam Nagar (part)
	3. Malipakar	6. Malipakar
	4. Chithalia	7. Chithalia, 8. Ilam Malik 9. Ilam, 10. Uttar Bejpur, 11. Bejpura, 12. Maslandapur, 13. Bansdol and 14. Dubol
2. Uttar Kumedpur	5. Uttar Kumedpur	15. Uttar Kumedpur, 16. Arjuna and 17. Basant Dhanipura
	6. Khanta	18. Khanta, 19. Raghabpur, 20. Sahapur and 21. Datian
	7. Talbhakuria	22. Talbhakuria, 23. Suriyapura Tengura (part) and 24. Khopakati (part)
	8. Belsur	25. Belsur and 26. Talsur (part)
	9. Malior	27. Malior, 28. Samukha, 29. Tetia and 30. Jalalpur
3. Talgram	10. Talgram	31. Talgram, 32. Kankani, 33. Hariharpur, 34. Putia, 35. Betahal and 36. Sahara Bahara
4. Sadlichak	11. Sadlichak	37. Sadlichak, 38. Maharapara, 39. Bhuna and 40. Nawapara
	12. Basudebpur	41. Basudebpur, 42. Suriyapura Tengura (part), 43. Sikatani Inlis, 44. Sikatani, 45. Degree Inlis and 46. Khopakati (part)
5. Bhaluka	13. Bhaluka	47. Bhaluka, 48. Fatepur (part) and 49. Par Bhaluka
	14. Jagannathpur	50. Jagannathpur and 51. Degun
	15. Daulat Nagar	52. Daulat Nagar, 53. Dakshin Bhakuria and 54. Fatepur (part)
	16. Mihaghat	55. Mihaghat and 56. Uttar Bhakuria
6. Mashaldaha	17. Mashaldaha	57. Mashaldaha and 58. Mohanpur
	18. Kariali	59. Kariali
	19. Talgachhi	60. Talgachhi, 61. Bhairabpur and 62. Hardam Nagar (part)
	20. Gaushpur	63. Gaushpur and 64. Latasi
7. Tulshihata**	21. Tulshihata	65. Hulaspur, 66. Chhatrak and 67. Monaharpur (part)
	22. Bhatol*	68. Jayrampur and 69. Bildaha
8. Uttar Harish chandrapur***	23. Sultan Nagar	70. Sultan Nagar, 71. Dakshin Mukundapur, 72. Dahara, 73. Chaksatan, 74. Kushol, 75. Sayra, 76. Darol, 77. Saranpur and 78. Monaharpur (part)

Source: Compiled by author, based on field survey.

*, **and*** are first, third and fourth order central places respectively, lie outside the pilot study area. Dependent settlements serial no. 65 to 78 of case study block comes under the nesting pattern of these central places.


COMPLEMENTARY REGIONS OF FIRST ORDER CENTRAL PLACES
HARISHCHANDRAPUR-II BLOCK
2001
TULSIHATA
TALGRAM
UTTAR KUMEDPUR
CHITHALIA
DAULATPUR
GAUSPUR
MASHALDAHA
BHALUKA
1 0 1 2 3
km
Source Based on empirical observation

Fig. 7.7

Table 7.9 exhibits that total population and area of Harishchandrapur-II block are served by 23 central places at first order hierarchy, of which two central places i.e., Bhatol and Tulshihata lies out side the block. Among them, Daulat Nagar serves largest number of population and area i.e., 15671 persons and 19.61 sq. km of the block respectively, while Malior is estimated to serve the largest number of population i.e., 23801 persons up to 2021. Gaushpur central place serves lowest population and area i.e., 4422 persons and 4.11 sq. km. of the block respectively, while the dependent population of it may reach at 6344 persons up to 2021. It is also observed that among 15 first order central places, Daulat Nagar and Jagannathpur has scored highest i.e., 234.80 and lowest i.e., 39.07 centrality score in the block respectively (Table 7.9).

It is observed from the field observation that the first order (i.e., lowest order) central place provides the lowest order functions with an exception of five first order central places that provides second order functions like, Sultan Nagar and Daulat Nagar provides ASDC, Khanta and Mihaghat provides CB, and Malior provides HS, and Kariali provides RWS (4^{th} order function). It is surprising that, though the facility BHQ falls in fourth order functional hierarchy but located at first order central place i.e., Khanta in the block.

Table 7.10 exhibits the weightage value of first order facilities existing within the complementary region of first order central places. Complementary region of Sultan Nagar central place has obtained highest weightage value i.e., 224.60 of first order functions in the block. The complementary region of Tulshihata central place has achieved weightage value 406.86 more than that of Sultan Nagar but lies outside the study block. Sultan Nagar is followed by Bhaluka (201.88), Sadlichak (196.86) and so on, however the lowest weightage value i.e., 41.65 has been attained by the complementary region of Jagannathpur central place (Table 7.10).

7.4.2 Complementary Region of Second Order Central Places

In Harishchandrapur-II block, six second order central places have been identified. Through the field study it has been observed that total population and area of the block are not served by the identified second order central places. 13 inhabited settlements of Sultan Nagar gram panchayat i.e., Jayrampur, Bildaha, Monaharpur,

Table 7.9: Complementary Region of Central Places at First Order Hierarchy
Harishchandrapur-II Block
(2001)

Sl. No.	Complementary Region of Central Places	Centrality Score	Population of the Central Place		Population Served		Area served (sq. km)
			2001	2021 (P)	2001	2021(P)	
1.	Daulatpur*	370.80	7393	10921	10289	14993	10.58
2.	Uttar Kumedpur*	256.57	4955	7031	9159	13175	8.35
3.	Talgram*	236.51	4058	5678	8810	12938	10.49
4.	Sadlichak*	243.62	2796	3754	7128	9792	7.90
5.	Bhaluka*	385.89	5986	8208	10453	14579	10.69
6.	Mashaldaha*	366.40	3305	4353	8150	10326	6.58
7.	Gaushpur	62.41	1315	2139	4422	6344	4.11
8.	Malipakar	39.76	7147	18245	7147	10245	4.74
9.	Chithalia	66.93	2549	3091	9466	12604	11.92
10.	Sultan Nagar	174.14	2891	3931	12985	18631	15.96
11.	Khanta	206.62	4021	6345	12815	19847	10.42
12.	Basudebpur	46.46	1432	1964	5611	7999	5.56
13.	Talbhakuria	73.96	6554	9538	10109	14431	14.11
14.	Daulat Nagar	234.80	9220	11506	15671	20371	19.61
15.	Mihaghat	95.48	5180	8412	6282	9584	14.00
16.	Belsur	56.01	5148	9588	9287	13237	8.84
17.	Malior	180.39	7354	10556	11121	23801	9.30
18.	Talbangrua	75.43	6469	8253	12086	15836	11.21
19.	Talgachhi	166.65	6097	8185	10279	14075	9.69
20.	Jagannathpur	39.07	5797	8655	6905	10965	7.62
21.	Kariali	166.21	4456	6628	4456	6628	6.87
22.	Bhatol**	51.89	1750	2378	7601	9583	12.16
23.	Tulshihata**	956.31	3509	4417	14817	19145	19.12
	Total	-	-	-	215049	309,129	239.83

Source: Computed by author, based on Field Survey.

* Central places of second order hierarchy.

** Both the central places (Bhatol of first order hierarchy and Tulshihata of third order hierarchy) lies outside the case study area. They lie to the block Harishchandrapur-I, but serves to the population of case study area. Their total population and area served including dependent settlements of both blocks (HCPur-I and HCPur-II) are counted in the present analysis.

P – Projected population of the year 2021.

Note: Population and area of dependent settlements of central place including its own.

Table 7.10: Weightage value or Centrality Score of First Order Facilities within the Complementary Region of Central Places of First Order Hierarchy

Harishchandrapur-II Block

(2001)

Complementary Region of Central Place	Primary school	Middle school	Sec school	Dispen - sary	Branch Post Office	Telephone*	Fare Bus Stop	Pucca Road*	Electricity for domestic purpose*	Tap water*	Elec- tricity for Agri- culture	Fertilizer distribution Centre	Agricultural credit society	Periodic market	Total weightage value
1 Daulatpur	7 9	0	0	0	24 64	12 96	9 69	6 04	0	0	9 76	86 38	18 20	18 84	194 41
2 Uttar Kumedpur	7 9	12 67	0	0	0	12 96	0	6 04	2 0	0	9 76	111 06	18 20	0	180 59
3 Talgram	9 48	0	0	0	12 32	25 92	0	0	4 0	0	14 64	24 68	0	18 84	109 88
4 Sadhichak	6 32	25 34	16 08	0	12 32	19 44	0	0	4 0	0	14 64	98 72	0	0	196 86
5 Bhaluka	12 64	0	0	0	24 64	12 96	19 38	12 08	2 0	34 36	9 76	37 02	18 20	18 84	201 88
6 Mashaldaha	3 16	12 67	16 08	0	12 32	6 48	9 69	6 04	2 0	0	4 88	12 34	0	18 84	104 50
7 Goushpur	4 74	0	0	0	12 32	6 48	9 69	12 08	1 0	0	4 88	0	0	18 84	70 03
8 Malipakar	3 16	0	0	0	0	0	9 69	6 04	1 0	0	4 88	0	18 20	0	42 97
9 Chithalia	7 9	25 34	16 08	0	12 32	6 48	0	12 08	0	0	0	24 68	0	18 84	123 72
10 Sultan Nagar	11 06	12 67	16 08	19 37	12 32	25 92	0	12 08	6 0	34 36	19 52	37 02	18 20	0	224 60
11 Khanta	1 58	25 34	0	0	12 32	6 48	0	6 04	3 0	17 18	4 88	0	0	0	76 82
12 Basudebpur	3 16	0	0	0	12 32	6 48	0	6 04	1 0	0	0	24 68	36 40	0	90 08
13 Talbhakuria	6 32	12 67	0	19 37	0	6 48	0	6 04	0	0	4 88	0	18 20	0	73 96

Contd...

(Contd Table 7 10)

Complementary Region of Central Place	Primary school	Middle school	Sec school	Dispen - sary	Branch Post Office	Telephone*	Fare Bus Stop	Pucca Road*	Electricity for domestic purpose*	Tap water*	Elec- tricity for Agri- culture	Fertilizer distribution Centre	Agricultural credit society	Periodic market	Total weightage value
14 Daulat Nagar	9 48	12 67	16 08	0	12 32	12 96	0	6 04	0	0	0	37 02	0	18 84	125 41
15 Mihaghat	9 48	12 67	0	0	12 32	6 48	9 69	6 04	0	0	4 88	0	0	0	61 56
16 Belsur	7 9	12 67	16 08	0	12 32	6 48	0	0	2 0	0	0	24 68	0	18 84	100 97
17 Malior	9 48	25 34	32 16	0	12 32	6 48	0	6 04	1 0	0	0	24 68	0	18 84	136 34
18 Talbangrua	9 48	25 34	16 08	0	12 32	19 44	0	0	0	0	0	0	0	18 84	101 50
19 Talgachhi	4 74	12 67	16 08	0	24 64	12 96	0	0	1 0	0	9 76	24 68	0	0	106 53
20 Jagannathpur	4 74	12 67	0	0	12 32	0	0	6 04	1 0	0	4 88	0	0	0	41 65
21 Kamali	3 16	0	0	0	12 32	6 48	9 69	6 04	1 0	0	4 88	24 68	0	18 84	87 09
22 Bhatol**	6 32	12 67	0	0	12 32	0	0	6 04	2 0	0	4 88	0	0	18 84	63 07
23 Tulshihata**	12 64	12 67	16 08	116 22	0	19 44	9 69	6 04	3 0	17 18	14 64	160 42	0	18 84	406 86

Source: Computed by author.

*In case of the facilities like Tel., PR, EDP, TW and EA, their weightage value in complementary region is calculated by multiplying the number of settlements with such facility by their individual weightage value. It is due to, such facilities are not counted in number rather counted in term of settlements with such function.

** Central Places lie out side the pilot study area.

Hulaspur, Chhatrak, Saranpur, Kushal, Sayra, Darol, Dakshin Mukundapur, Sultan Nagar, Chaksatan and Dahara in north-eastern part of the block depends on two such central places that lie outside the case study block, i.e. Tulshihata of third order and Uttar Harishchandrapur of fourth order hierarchy of central places of Harishchandrapur-I block. On the basis of consumer's preference to obtain functions of second hierarchical order at shortest distance with minimum traveling expenditure, physiographic obstruction and accessibility by means of transportation and communication, complementary region of each second order central place has been delineated and their dependent population and area have been estimated (Figure 7.8 and Table 7.11).

Among the second order central place Bhaluka with highest centrality score i.e., 385.89 serves total population of 45354 persons including its own population (5986 persons) while it is estimated to serve the total population of 63418 persons till 2021, but covers largest area i.e., 58.52 sq.km (Table 7.11). Highest population i.e., 52491 persons depend on the central place Uttar Kumedpur which is also estimated to serve highest population i.e., 84491 persons till 2021. Two central places i.e., Tulshihata and Uttar Harishchandrapur (lie out side the case study block) serves total population 5409 persons and 12984 persons of the study block respectively, while they are estimated to serve 8315 persons and 18632 persons till 2021 respectively.

Table 7.11: Complementary Region of Second Order Central Places
Harishchandrapur-II Block
(2001)

Sl. No.	Complementary Region of Central Place	Centrality Score	Population of the centre		Population served		Area served (sq.km.)
			2001	2021(P)	2001	2021(P)	
1.	Daulatpur	370.80	7393	10921	32945	45761	33.85
2.	Uttar Kumedpur	256.57	4955	7031	52491	84491	52.18
3.	Talgram	236.51	4058	5678	8810	12938	10.49
4.	Sadlichak	243.62	2796	3754	12739	17791	13.46
5.	Bhaluka	385.89	5986	8208	45354	63418	58.52
6.	Mashaldaha	366.40	3305	4353	27307	37373	27.25
7.	Tulshihata†	956.31	3509	4417	5409*	8315	5.49*
8.	Uttar Harish-Chandrapur†	1691.75	12962	18812	12984*	18632	15.96*
	Total	-	-	-	198039	288719	217.2

Source: Computed by author, based on field survey.

* Here only population and area of the dependent settlements of case study block served by Tulshihata (3rd order central place) and Uttar Harishchandrapur (4th order central place) are given in the table instead of total population and area being served them.

Note: P –Projected population and † – Central Places lie outside the pilot study area.

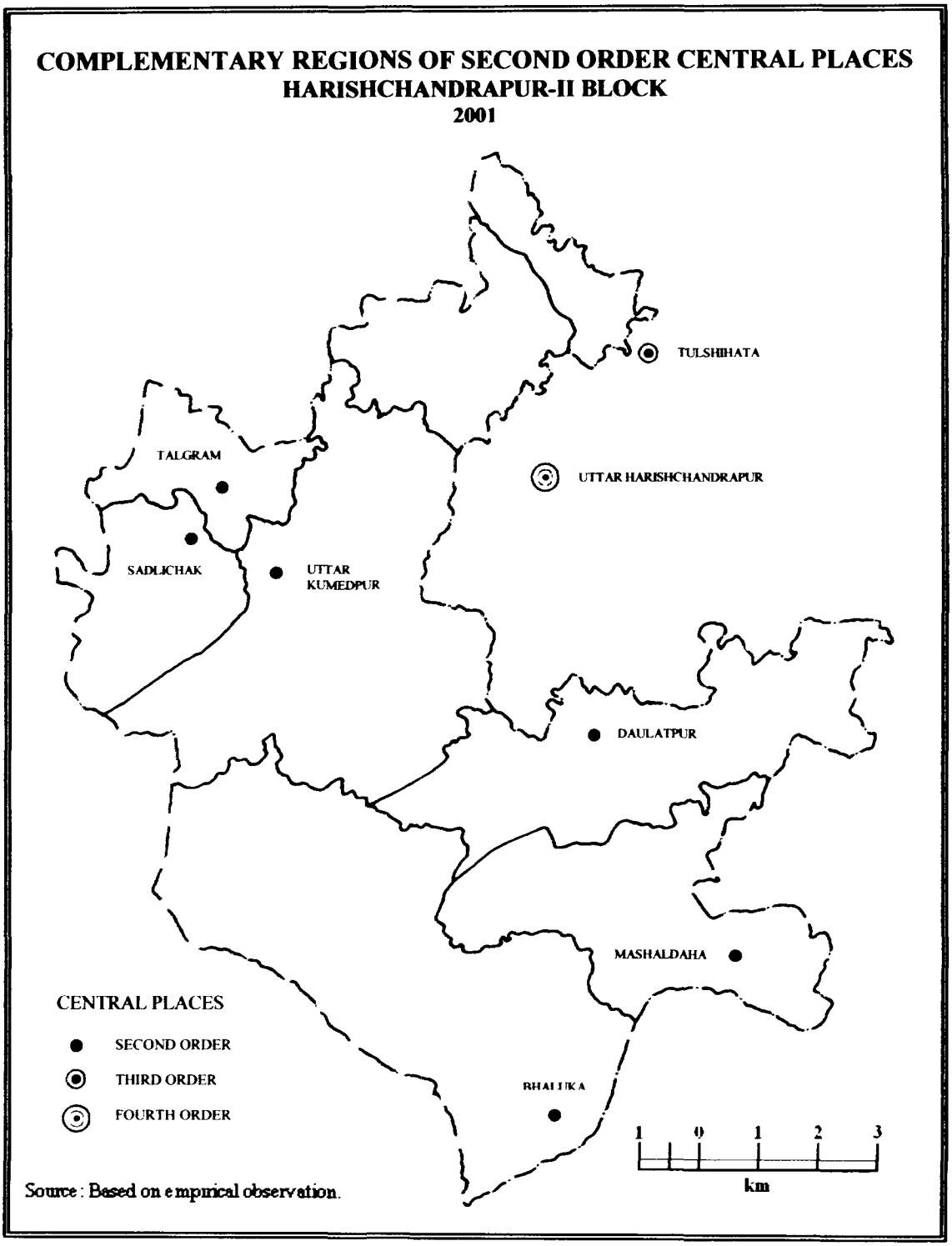
COMPLEMENTARY REGIONS OF SECOND ORDER CENTRAL PLACES
HARISHCHANDRAPUR-II BLOCK
2001
TULSIHATA
TALGRAM
UTTAR HARISHCHANDRAPUR
SADLICHAK
UTTAR KUMEDPUR
DAULATPUR
MASHALDAHA
CENTRAL PLACES
SECOND ORDER
THIRD ORDER
FOURTH ORDER
1 0 1 2 3
km
Source : Based on empirical observation.

Fig. 7.8

Table 7.12: Weightage value or Centrality Score of Second Order Facilities within the Complementary Region of Central Places of Second Order Hierarchy

Harishchandrapur-II Block

(2001)

Complementary Region of Central Place	Higher Secondary School	Primary Health Centre	Agricultural Seed Distribution Centre	Commercial Bank	Daily Market	Public Library	Free Reading Room	Cinema Talkies*	Block Animal Health Centre**	Additional Block Animal Health Centre**	Railway Station**	Total Weightage value
Daulatpur	0	0	40.69	0	0	51.5	51.5	0	0	123.34	0	267.03
Uttar Kumedpur	45.65	44.67	81.38	36.08	32.37	0	0	0	0	0	91.46	331.61
Talgram	0	0	0	0	0	0	0	71.55	0	0	91.46	163.01
Sadlichak	0	0	40.69	0	0	25.75	25.75	0	0	0	0	92.19
Bhaluka	45.65	44.67	81.38	36.08	32.37	25.75	25.75	0	116.29	0	0	407.94
Mashaldaha	45.65	44.67	0	36.08	0	25.75	25.75	0	0	0	91.46	269.36
Tulshihata†	45.65	0	122.07	0	32.37	25.75	25.75	71.55	116.29	0	0	439.43
Uttar Harish-chandrapur†	45.65	0	81.38	36.08	32.37	25.75	25.75	71.55	0	0	91.46	409.99

Source: Computed by author.

† Central places lie outside the case study area.

*third order facilities; **fourth order facilities.

Second order central places of the block serve third and fourth order functions, like, Talgram serves Cinema Talkies and RWS, Daulatpur serves ABHC, Bhaluka serves BAHC, Uttar Kumedpur and Mashaldaha serves RWS facilities.

Table 7.12 reveals the weightage score of second order functions existing within the complementary region of second order central place in the block. Among the six second order central places of the block, the complementary region of Bhaluka has attained highest weightage value i.e., 407.94 followed by Uttar Kumedpur (331.61), Mashaldaha (269.36) and so on, while lowest weightage value i.e., 92.19 has achieved by the complementary region of Sadlichak central place (Table 7.12).

7.5 SPATIAL ORGANISATION OF CENTRAL PLACES

Spatial organization of central places has special significance in the spatial planning framework aiming at integrated socio-economic development of the region. Spatial organization of central places is closely connected with the physical conditions, transportation system and distribution of settlements in the study region.

The analysis reveals that, first order central places are located at the average distance of 13.97 km. and they randomly distributed with Rn value 1.282 in the block. Second order central places are located at the mean spacing 34.92 km. and are distributed randomly with Rn value 1.277 (Table 7.13).

Table 7.13: Spatial Organization of Central Places
Harishchandrapur-II Block
(2001)

Sl. No.	Hierarchic Order of Central Place	No. of Central Place	Mean spacing (Km.)	Dispersion	
				N-N Index	Type
01.	First order	15	13.97	1.282	Random
02	Second order	06	34.92	1.277	Random

Source: Computed by author.

In Harishchandrapur-II block, there is absence of further higher order central places due to lack of higher order functions and existence of lower order only. However, three Railway stations (RWS), one block animal health centre (BAHC), one additional block animal health centre (ABHC), block headquarter (BHQ) of fourth order functions and one cinema talkies (Cin.) of third order functional hierarchy exist in the block. To avail higher order functions, inhabitants of the block depend on higher order central places that are located at the larger distance.

RELATIONSHIP BETWEEN CENTRALITY SCORE OF CENTRAL PLACES AND THEIR DEPENDENT POPULATION AND DEPENDENT AREA

The availability of different types of facilities in a settlement attracts people from the surrounding settlements. Generally, settlements having large number of different type of functions serve larger population of larger area. In the present study, the hypothesis, centrality score of central places is positively correlated to its dependent population and area, has been tested adopting Karl Pearson's technique of correlation coefficient and their level of significance has been tested using students 't' test technique.

Table 7.14: Correlation (r) between Centrality Score of Central Places and their Dependent Population and Dependent Area

Harishchandrapur-II Block

(2001)

Sl. No.	Central place	Centrality Score (X)	Dependent Population (Y)	Dependent Area (sq.km.) (Y_1)
1.	Daulatpur	370.80	33045	32.85
2.	Uttar Kumed Pur	256.57	52491	51.02
3.	Talgram	236.51	8810	10.49
4.	Sadlichak	243.62	12739	13.46
5.	Bhaluka	385.89	45354	57.52
6.	Mashaldaha	366.40	27307	27.25
7.	Gaushpur	62.41	4422	4.11
8.	Malipakar	39.76	7147	4.74
9.	Chithalia	66.93	9566	11.92
10.	Sultan Nagar	174.14	12985	15.96
11.	Khanta	206.62	12815	10.42
12.	Basudebpur	46.46	5611	5.56
13.	Talbhakuria	73.96	10109	14.11
14.	Daulat Nagar	234.80	15671	19.61
15.	Mihaghat	95.48	6282	14.00
16.	Belsur	56.01	9287	8.84
17.	Malior	180.39	11121	9.30
18.	Talbangrua	75.43	12086	11.21
19.	Talgachhi	166.65	10279	9.69
20.	Jagannathpur	39.07	6905	7.62
21.	Kariali	166.21	4456	6.87
	Total	3544.11	318488	346.55
	Computed		r = 0.741	r = 0.742
			t = 4.793	t = 4.822

Source: Computed by author.

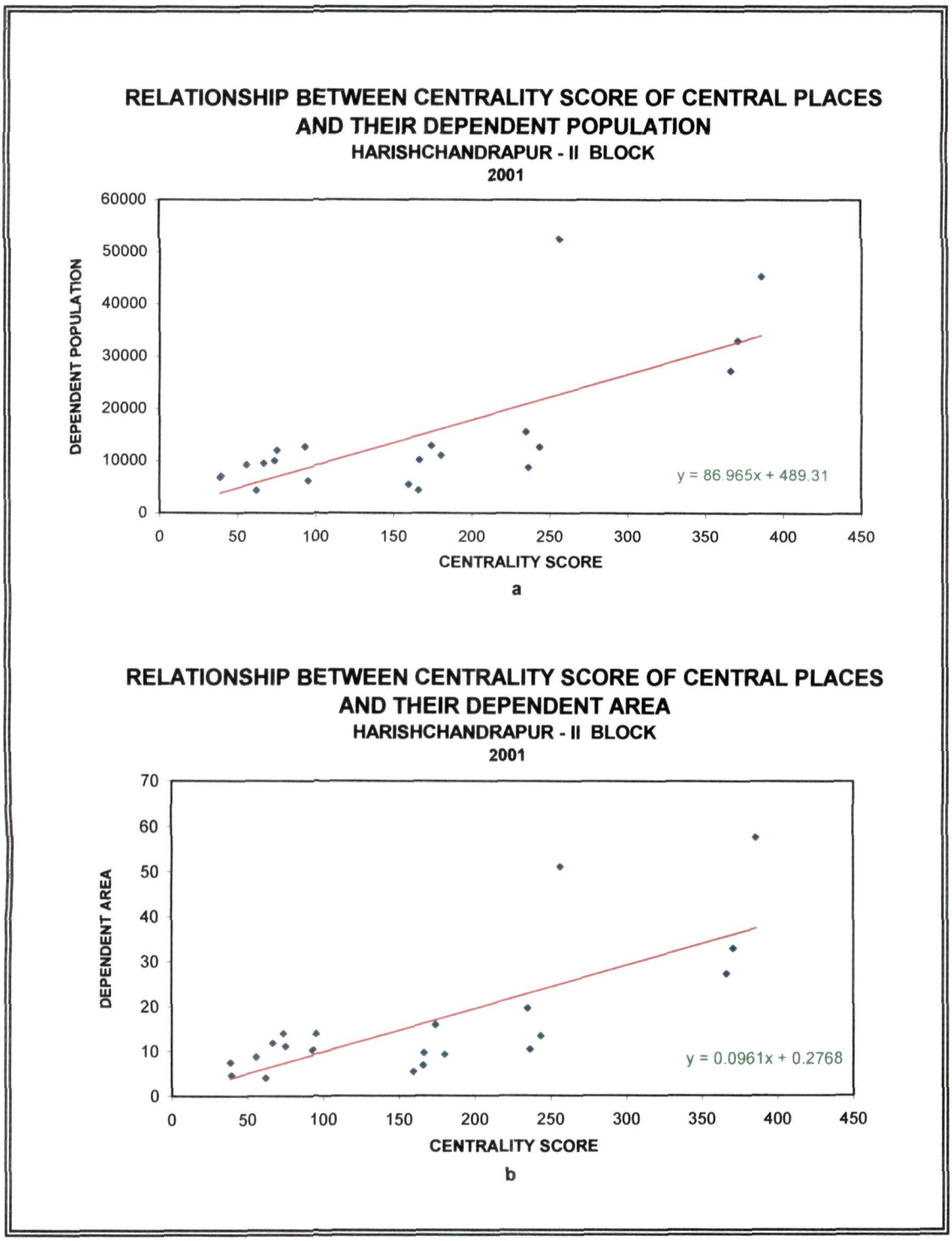
RELATIONSHIP BETWEEN CENTRALITY SCORE OF CENTRAL PLACES AND THEIR DEPENDENT POPULATION
HARISHCHANDRAPUR - II BLOCK
2001
DEPENDENT POPULATION
60000
50000
40000
30000
20000
10000
0
0
50
100
150
200
250
300
350
400
450
CENTRALITY SCORE
y = 86.965x + 489.31
a
RELATIONSHIP BETWEEN CENTRALITY SCORE OF CENTRAL PLACES AND THEIR DEPENDENT AREA
HARISHCHANDRAPUR - II BLOCK
2001
DEPENDENT AREA
70
60
50
40
30
20
10
0
0
50
100
150
200
250
300
350
400
450
CENTRALITY SCORE
y = 0.0961x + 0.2768
b

Fig. 7.9

Relationship between Centrality Score and Dependent Population

To study the causal association between centrality score being independent variable (X) and dependent population being dependent variable (Y), 21 central places (both first and second order) of the block has been taken as unit of study (Table 7.14). Both are positively correlated at high degree with r value 0.741. The calculated 't' value 4.793 is more than the tabulated 't' value 2.86 at 19 degree of freedom, proves the correlation is significant at 1 percent level. Computed equation, y = 86.965x + 489.31 in the scatter diagram gives the best fit regression line to determine the linear relationship between centrality score of central places and their dependent population (Fig. 7.9a).

Relationship between Centrality Score and Dependent Area

Independent variable i.e., centrality score (X) has been correlated with dependent variable i.e., dependent area (Y_1) taking 21 central places as units of study into account. Same as previous correlation, both X and Y_1 are positively correlated at higher degree i.e., r= 0.742 (Table 7.14). Computed 't' value 4.822 is more than the tabulated 't' value 2.86 at 19 degree of freedom, which reveals the correlation is significant at 1 percent level. Computed equation, y= 0.0961x + 0.2768 in the scatter diagram gives the best fit regression line to determine the linear relationship between these two variables i.e., X and Y_1 (Fig. 7.9b).

The correlation and linear regression analysis accepts the hypothesis and it may be ascertained that, a central place with high functional importance attracts large number of people from longer distance.

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CHAPTER - 8

IDENTIFICATION OF SPATIO-FUNCTIONAL GAPS AND PROPOSED DIAGNOSTIC PLANNING

IDENTIFICATION OF SPATIO-FUNCTIONAL GAPS AND PROPOSED DIAGNOSTIC PLANNING

Socio-economic amenities and facilities are not equally accessible to all the settlements in a region. Therefore, few settlements are adequately served by the available facilities, while others are inadequately served. The adequacy or inadequacy of facilities is associated with the unplanned allocation of facilities in different settlements. Uneven distribution of socio-economic facilities in accordance to population can be understood through the analysis of functional gap. It helps in assessing the requirement of additional facilities within the complementary region, and gives a direction to determine their optimal new location to attain balanced regional development. In the present chapter an attempt has been made to propose a micro-level planning model for the plan period till 2021.

8.1 IDENTIFICATION OF FUNCTIONAL GAPS

Adequacy or inadequacy of existing functions within the complementary region of central places depend both on the number of population and on the area of complementary region. Villages are considered as the lowest level of planning units. Within the framework of bottom-up approach, the cluster of villages with a central village (central place) forming the focal point of functional linkages is generally considered as the best unit for planning purpose[1]. 'The smaller service centres tend to 'nest' under the higher order service centres. Thus accordingly the basic unit of measurement would be that service centre which has lowest population and smallest area under its influence zone'.[2] In the present study the spatio-functional gaps of both first and second order central places including their service area has been identified in the block Harishchandrapur-II (case study area).

The centrality score of each central place including their complementary region have been analysed in previous chapter (Table 7.4 and 7.6). In the present analysis ratios of function between the complementary region and the study area (Malda district) has been analysed for relative comparisons to identify the functional gap. The gaps are examined by considering population as a unit of measurement, based on the following equation.[3]

$$K_{ij} = \frac{P}{P_1} \times \frac{F_1}{F}$$

Where, R_{ij} is the relative level or the ratio of ith function between the jth central place including its complementary region and the study area as a whole,

P is the population of study area (Malda district) as a whole,

P_1 is the population of central place including its complementary region,

F_1 is the total centrality score of ith function of central place including its complementary region,

F is the total centrality score of ith function of study region (Malda district) as a whole.

When the ratio of function between the complementary region and the study area as a whole is more than 01, the region is supposed to be adequately served, while the ratio less than 01, region is inadequately served. Again, the ratio near to '0' indicates higher functional gap which is reducing as much as the ratio is moving from '0' to 01.

8.2 SPATIAL ANALYSIS OF FUNCTIONAL GAPS IN THE YEAR 2001 AND 2021

Spatio-functional gap of each existing socio-economic facility within the complementary region of both first and second order central places has been estimated according to the population of 2001 and projected population of 2021.

8.2.1 Spatio-Functional Gaps in 2001

Table 8.1 exhibits the spatio-functional gap of first order facilities within the complementary region of central places at first order hierarchy. A discussion of function-wise adequacies and inadequacies is as follows;

Primary School

Table 8.1 reveals that among first order complementary regions, Khanta scored lowest ratio i.e. 0.16 in primary school facility. Lower functional ratio i.e., higher functional gap suggests large number of facilities are required to attain the balanced regional development. Mihaghat complementary region has scored highest ratio i.e., 1.65 in primary school. 04 complementary regions i.e., Talgram, Bhaluka, Gaushpur and Mihaghat with functional ratio more than 1.0 are adequately served, while 19 complementary regions i.e., Daulatpur, Uttar Kumedpur, Sadlichak, Mashaldaha, Malipakar, Chithalia, Sultan Nagar, Khanta, Basudebpur, Talbhakuria, Daulat Nagar, Belsur, Malior, Talbangrua, Talgachhi, Jagannathpur, Kariali, Bhatol

Table 8.1: Spatio-Functional Gaps (according to population) of First Order Facilities in the Complementary Region of Central Places of First Order Hierarchy

Harishchandrapur-II Block

(2001)

Complementary Region of Central Place	Primary School	Middle School	Secondary School	Dispen-sary	Branch Post Office	Tele-phone	Fare Bus Stop	Pucca Road	Elec-tricity for Domestic Purpose	Tap water	Electri-city for Agri-culture	Fertilizer Distri-bution centre	Agricul-tural Credit Society	Periodic Market
1. Daulatpur	0.84	0	0	0	2.23	1.24	0.89	0.58	0	0	1.06	2.09	1.98	2.12
2. Uttar Kumedpur	0.94	1.16	0	0	0	1.39	0	0.65	0.56	0	1.18	3.03	2.23	0
3. Talgram	1.18	0	0	0	1.30	2.90	0	0	1.16	0	0.58	0.70	0	2.47
4. Sadlichak	0.97	2.99	2.13	0	1.61	2.69	0	0	1.44	0	2.28	3.46	0	0
5. Bhaluka	1.32	0	0	0	2.19	1.22	1.76	1.14	0.49	3.70	1.04	0.88	1.95	2.08
6. Mashaldaha	0.42	1.31	1.86	0	1.41	0.78	1.13	0.73	0.63	0	0.67	0.38	0	2.67
7. Gaushpur	1.17	0	0	0	2.59	1.44	2.08	2.69	0.58	0	1.23	0	0	4.93
8. Malipakar	0.48	0	0	0	0	0	1.29	0.83	0.36	0	0.76	0	2.86	0
9. Chithalia	0.91	2.25	1.60	0	1.22	0.67	0	1.25	0	0	0	0.65	0	2.30
10. Sultan Nagar	0.93	0.82	1.17	0.70	0.88	1.97	0	0.91	1.18	2.98	1.67	0.71	1.57	0
11. Khanta	0.16	1.66	0	0	0.89	0.50	0	0.46	0.60	1.51	0.42	0	0	0
12. Basudebpur	0.62	0	0	0	2.04	1.14	0	1.06	0.46	0	0	1.10	7.28	0
13. Talbhakuria	0.68	1.05	0	0.89	0	0.63	0	0.59	0	0	0.54	0	2.02	0
14. Daulat Nagar	0.66	0.68	0.97	0	0.73	0.81	0	0.38	0	0	0	0.59	0	1.39
15. Mihaghat	1.65	1.69	0	0	1.82	1.02	1.46	0.94	0	0	0.86	0	0	0
16. Belsur	0.93	1.15	1.63	0	1.23	0.69	0	0	0.55	0	0	0.66	0	2.35
17. Malior	0.93	1.91	2.73	0	1.03	0.57	0	0.53	0.23	0	0	0.55	0	1.96
18. Talbangrua	0.86	1.76	1.25	0	0.95	1.58	0	0	0	0	0	0	0	1.80
19. Talgachhi	0.50	1.03	1.47	0	2.23	1.24	0	0	0.25	0	1.06	0.60	0	0
20. Jagannathpur	0.75	1.54	0	0	1.66	0	0	0.86	0.37	0	0.79	0	0	0
21. Kariali	0.78	0	0	0	2.57	1.43	2.06	1.33	0.57	0	1.22	1.38	0	4.89
22. Bhatol*	0.91	1.40	0	0	1.51	0	0	0.78	0.67	0	0.71	0	0	2.87
23. Tulshihata*	0.93	0.72	1.02	3.66	0	1.29	0.62	0.40	0.52	1.31	1.10	2.70	0	1.47

Source: Computed by author, *Lies outside the case study area

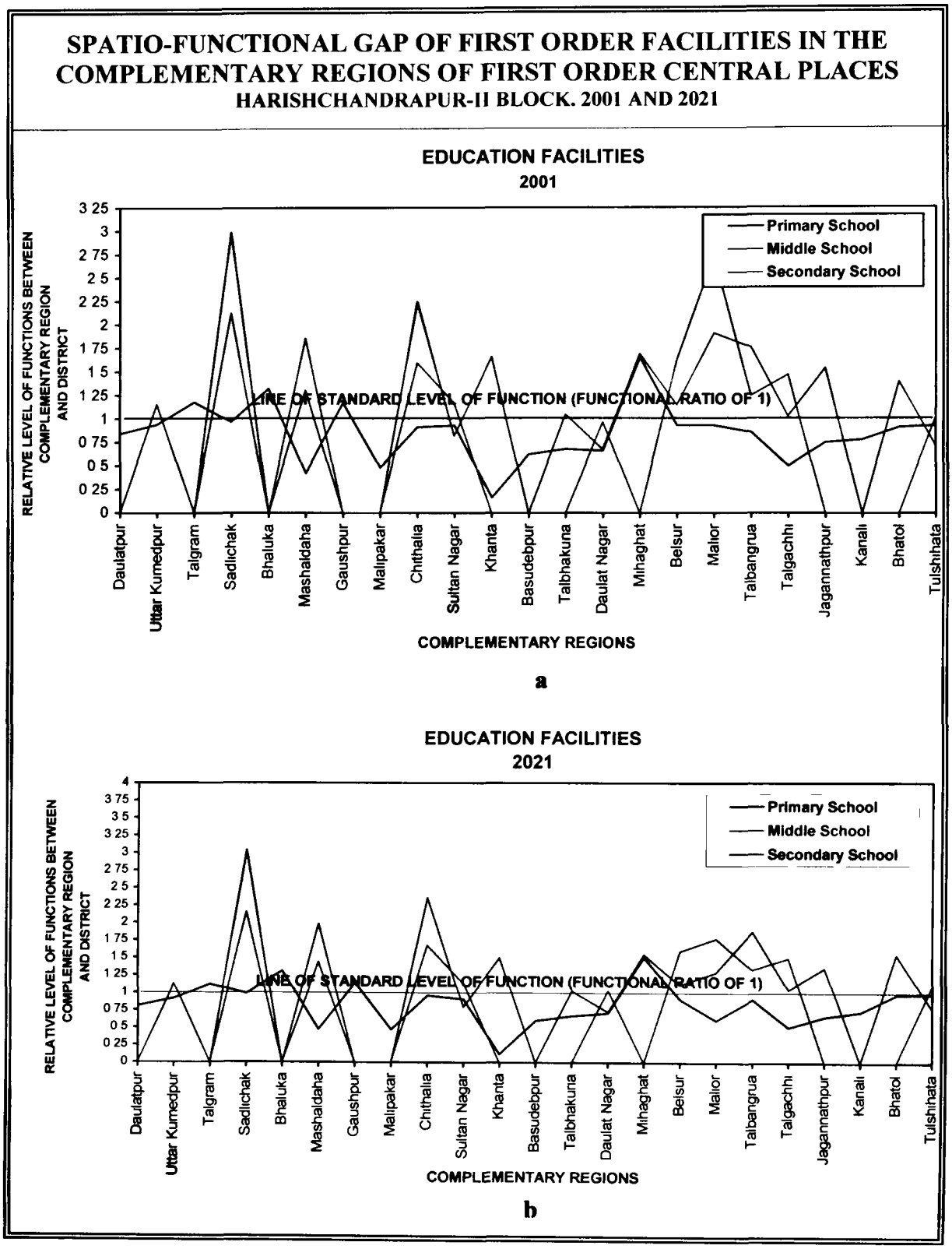

SPATIO-FUNCTIONAL GAP OF FIRST ORDER FACILITIES IN THE COMPLEMENTARY REGIONS OF FIRST ORDER CENTRAL PLACES
HARISHCHANDRAPUR-II BLOCK. 2001 AND 2021
EDUCATION FACILITIES
2001
RELATIVE LEVEL OF FUNCTIONS BETWEEN COMPLEMENTARY REGION AND DISTRICT
Primary School
Middle School
Secondary School
LINE OF STANDARD LEVEL OF FUNCTION (FUNCTIONAL RATIO OF 1)
Daulatpur
Uttar Kumedpur
Talgram
Sadichak
Bhaluka
Mashaldaha
Gaushpur
Malipakar
Chithalia
Sultan Nagar
Khanta
Basudebpur
Talbhakuna
Daulat Nagar
Mihaghat
Belsur
Malior
Talbangrua
Talgachhi
Jagannathpur
Kanali
Bhatol
Tulshihata
COMPLEMENTARY REGIONS
a
EDUCATION FACILITIES
2021
RELATIVE LEVEL OF FUNCTIONS BETWEEN COMPLEMENTARY REGION AND DISTRICT
Primary School
Middle School
Secondary School
LINE OF STANDARD LEVEL OF FUNCTION (FUNCTIONAL RATIO OF 1)
Daulatpur
Uttar Kumedpur
Talgram
Sadichak
Bhaluka
Mashaldaha
Gaushpur
Malipakar
Chithalia
Sultan Nagar
Khanta
Basudebpur
Talbhakuna
Daulat Nagar
Mihaghat
Belsur
Malior
Talbangrua
Talgachhi
Jagannathpur
Kanali
Bhatol
Tulshihata
COMPLEMENTARY REGIONS
b

Fig. 8.1

and Tulshihata with functional ratio less than 01 are inadequately served by this facility (Table 8.1 and Fig. 8.1a).

Middle School

13 complementary regions i.e., Uttar Kumedpur, Sadlichak, Mashaldaha, Chithalia, Khanta, Talbhakuria, Mihaghat, Belsur, Malior, Talbangrua, Talgachhi, Jagannathpur and Bhatol have recorded better standard of middle school facility. However, 03 complementary regions i.e., Sultan Nagar, Daulat Nagar and Tulshihata with functional ratio less than 01 show below standard and 07 complementary regions i.e., Daulatpur, Talgram, Bhaluka, Gaushpur, Malipakar, Basudebpur and Kariali have no middle school facility (Table 8.1 and Fig. 8.1a).

Secondary school

09 complementary regions i.e., Sadlichak, Mashaldaha, Chithalia, Sultan Nagar, Belsur, Malior, Talbangrua, Talgachhi and Tulshihata are adequately served by secondary school, while 13 complementary regions are not located with it. Daulat Nagar (0.97) complementary region is inadequately served by it (Table 8.1 and Fig. 8.1a).

Dispensary

Harishchandrapur-II Block is very poorly served by the dispensary. Only 03 complementary regions are having this facility, of which Sultan Nagar and Talbhakuria are inadequately served, and Tulshihata (lies outside the block) is adequately served though (Table 8.1 and Fig. 8.2a).

Branch Post Office

15 complementary regions (including Bhatol lies outside but cover part of case study area) namely, Daulatpur, Talgram, Sadlichak, Bhaluka, Mashaldaha, Gaushpur, Chithalia, Basudebpur, Mihaghat, Belsur, Malior, Talgachhi, Jagannathpur, Kariali and Bhatol have recorded better standard of branch post office facility, while rest complementary regions are inadequately served by it (Table 8.1 and Fig. 8.3a).

Telephone

Regarding the telephone facility, 10 complementary regions i.e., Mashaldaha, Malipakar, Chithalia, Khanta, Talbhakuria, Daulat Nagar, Belsur, Malior, Jagannathpur and Bhatol are inadequately served, among them Malipakar,

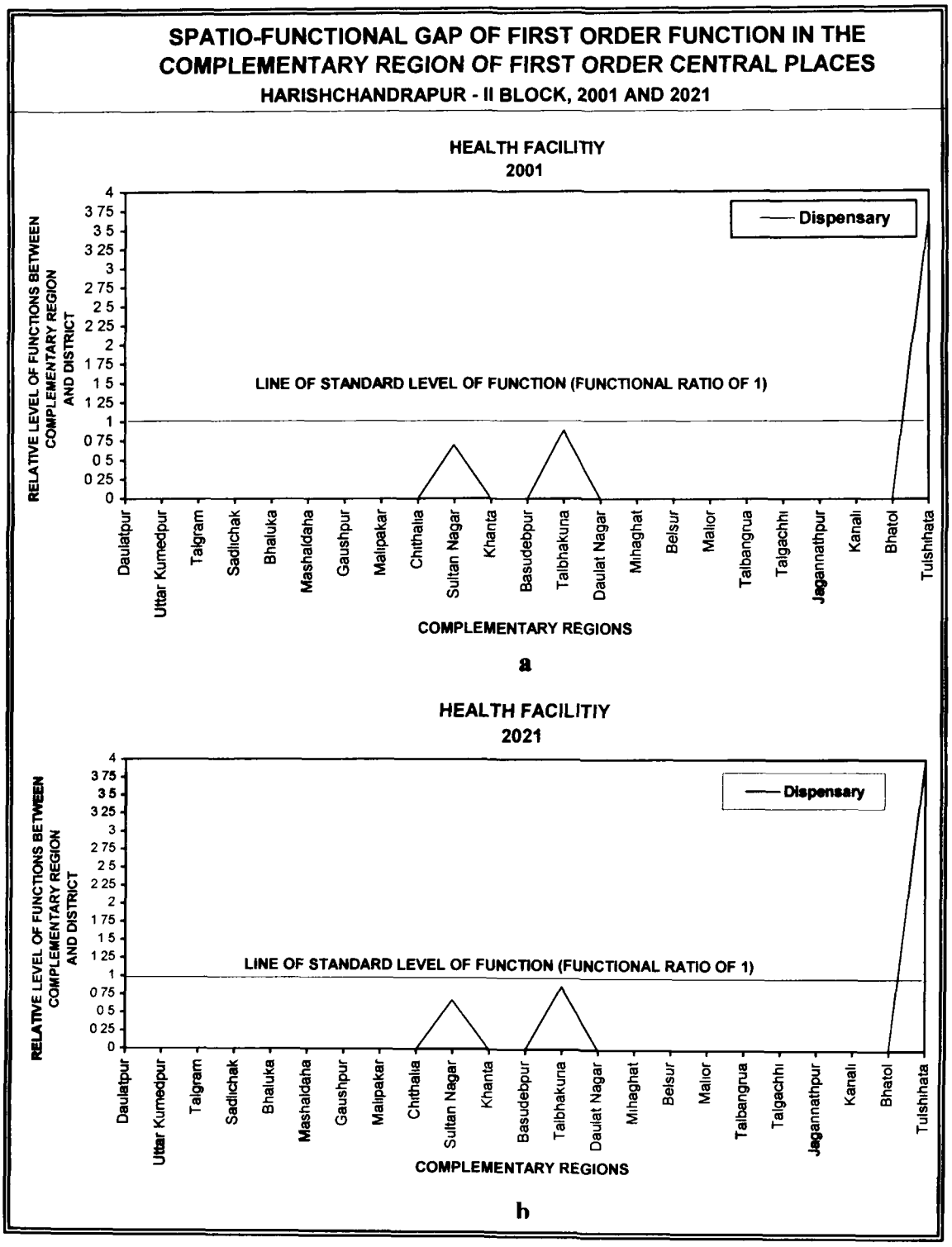

SPATIO-FUNCTIONAL GAP OF FIRST ORDER FUNCTION IN THE COMPLEMENTARY REGION OF FIRST ORDER CENTRAL PLACES
HARISHCHANDRAPUR - II BLOCK, 2001 AND 2021
HEALTH FACILITIY
2001
RELATIVE LEVEL OF FUNCTIONS BETWEEN COMPLEMENTARY REGION AND DISTRICT
Dispensary
LINE OF STANDARD LEVEL OF FUNCTION (FUNCTIONAL RATIO OF 1)
4
3 75
3 5
3 25
3
2 75
2 5
2 25
2
1 75
1 5
1 25
1
0 75
0 5
0 25
0
Daulatpur
Uttar Kumedpur
Talgram
Sadlichak
Bhaluka
Mashaldaha
Gaushpur
Malipakar
Chithalia
Sultan Nagar
Khanta
Basudebpur
Talbhakuna
Daulat Nagar
Mihaghat
Belsur
Malior
Talbangrua
Talgachhi
Jagannathpur
Kanali
Bhatol
Tulshihata
COMPLEMENTARY REGIONS
a
HEALTH FACILITIY
2021
RELATIVE LEVEL OF FUNCTIONS BETWEEN COMPLEMENTARY REGION AND DISTRICT
Dispensary
LINE OF STANDARD LEVEL OF FUNCTION (FUNCTIONAL RATIO OF 1)
4
3 75
3 5
3 25
3
2 75
2 5
2 25
2
1 75
1 5
1 25
1
0 75
0 5
0 25
0
Daulatpur
Uttar Kumedpur
Talgram
Sadlichak
Bhaluka
Mashaldaha
Gaushpur
Malipakar
Chithalia
Sultan Nagar
Khanta
Basudebpur
Talbhakuna
Daulat Nagar
Mihaghat
Belsur
Malior
Talbangrua
Talgachhi
Jagannathpur
Kanali
Bhatol
Tulshihata
COMPLEMENTARY REGIONS
b

Fig. 8.2

Jagannathpur and Bhatol have no telephone facility. Rest 13 complementary regions show better standard of this facility (Table 8.1 and Fig. 8.3a).

Fare Bus Stop

The block is poorly served by fare bus stop facility. Only 06 complementary regions show adequacy of this facility are Bhaluka, Mashaldaha, Gaushpur, Malipakar, Mihaghat and Kariali. 02 complementary regions, i.e. Daulatpur (0.89) and Tulshihata (0.62) lies below the standard level of this facility, while rest 15 complementary regions are not have this facility (Table 8.1 and Fig. 8.3a).

Pucca Road

13 complementary regions i.e., Daulatpur, Uttar Kumedpur, Mashaldaha, Malipakar, Sultan Nagar, Khanta, Talbhakuria, Daulat Nagar, Mihaghat, Malior, Jagannathpur, Bhatol and Tulshihata are inadequately served by the pucca road facility. Talgram, Sadlichak, Belsur, Talbangrua and Talgachhi are not located with pucca road facility and rest complementary regions show adequacy of this facility (Table 8.1 and Fig. 8.3a).

Electricity for Domestic Purpose

Though the analysis of spatial distribution reveals that, electricity for domestic purpose is approaching uniform among each size group of settlements in the district as well as block, but has recorded certain functional gap within majority of the complementary regions (Table 8.1). In the block, 03 complementary regions i.e., Talgram, Sadlichak and Sultan Nagar are adequately served by this facility, 14 complementary regions inadequately served. Rest six complementary regions i.e., Daulatpur, Chithalia, Talbhakuria, Daulat Nagar, Mihaghat and Talbangrua are not located with this facility (Table 8.1 and Fig. 8.4a).

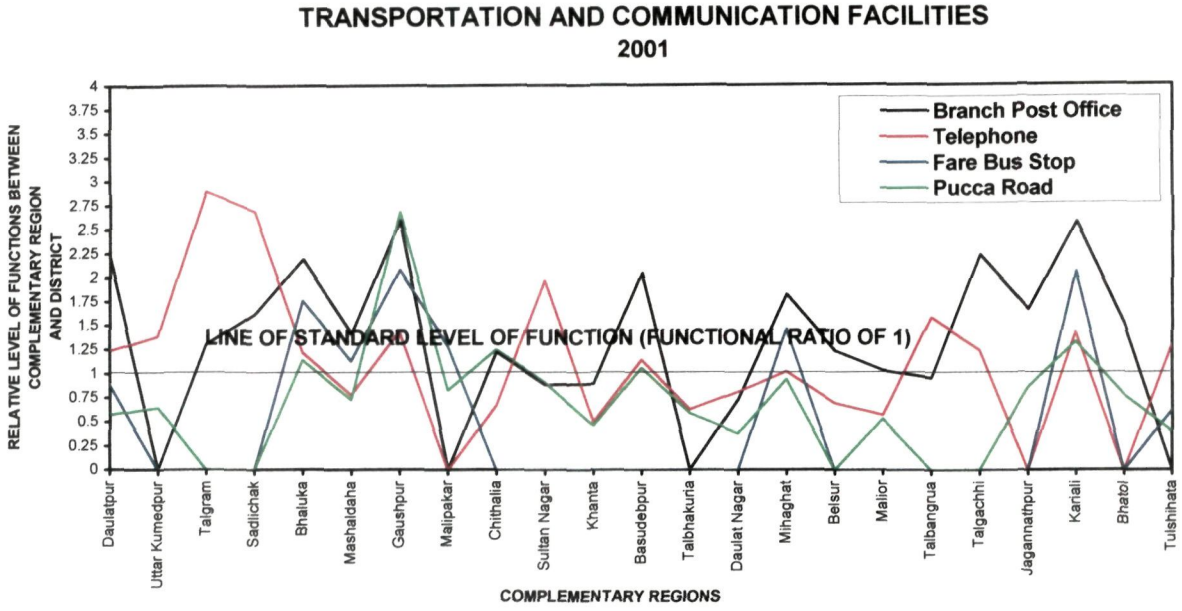
Tap Water

The study region has registered higher lack of potable water facility. Three complementary regions i.e., Bhaluka, Sultan Nagar and Khanta are adequately served by the tap water facility, while rest complementary regions are not having it (Table 8.1 and Fig. 8.4a).

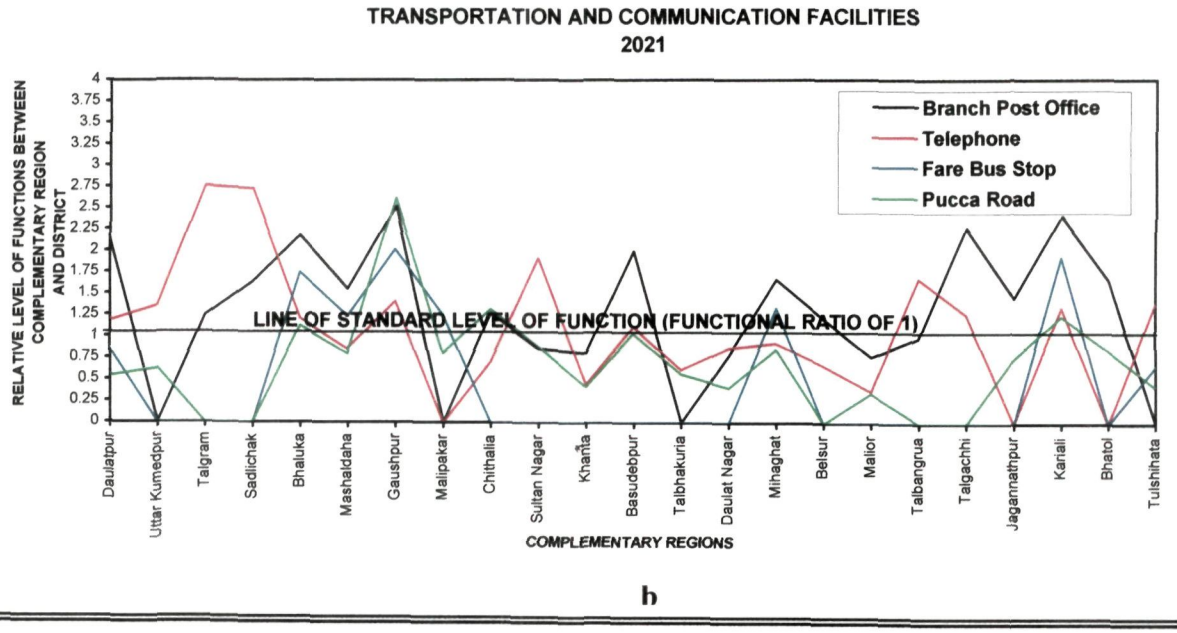
Electricity for Agriculture

07 complementary regions i.e., Talgram, Mashaldaha, Malipakar, Khanta, Talbhakuria, Mihaghat and Jagannathpur are inadequately served by electricity for

SPATIO-FUNCTIONAL GAP OF FIRST ORDER FACILITIES IN THE COMPLEMENTARY REGION OF FIRST ORDER CENTRAL PLACES
HARISHCHANDRAPUR-II BLOCK, 2001 AND 2021



a



b

Fig. 8.3

agriculture. Bhatol is also inadequately served though lies outside but serves the population of the case study block. 06 complementary regions i.e., Chithalia, Basudebpur, Daulat Nagar, Malior, Talbangrua and Belsur are not located with this facility. Rest 09 service areas show better standard of this facility (Table 8.1 and Fig 8.5a).

Fertilizer Distribution Centre

The analysis reveals that 16 complementary regions i.e. Talgram, Bhaluka, Mashaldaha, Gaushpur, Malipakar, Chithalia, Sultan Nagar, Khanta, Talbhakuria, Daulat Nagar, Mihaghat, Belsur, Malior, Talbangrua, Talgachhi and Jagannathpur are inadequately served by the facility of fertilizer distribution centre. Bhatol is also inadequately served. However, only 06 complementary regions show better standard of this facility (Table 8.1 and Fig. 8.5a).

Agricultural Credit Society

Regarding the facility of agricultural credit society, Daulatpur, Uttar Kumedpur, Bhaluka, Malipakar, Sultan Nagar, Basudebpur and Talbhakuria complementary regions have registered better standard of this facility. Rest complementary regions are not located with this facility (Table 8.1 and Fig. 8.5a).

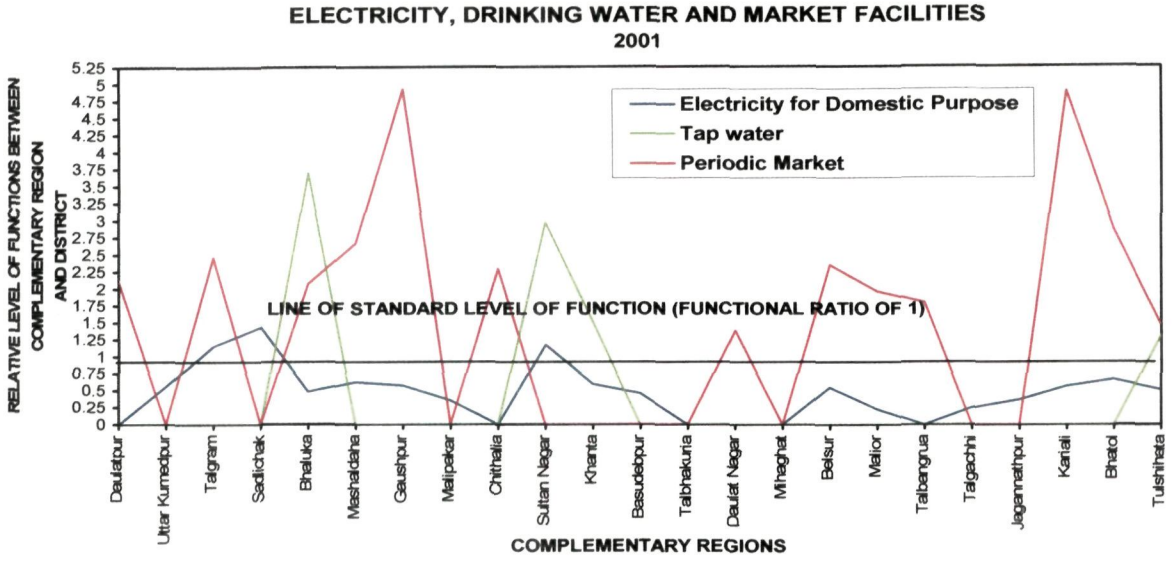
Periodic Market

Table 8.1 and Figure 8.4a reveals that 10 complementary regions of Uttar Kumedpur, Sadlichak, Malipakar, Sultan Nagar, Khanta, Basudebpur, Talbhakuria, Mihaghat, Talgachhi and Jagannathpur have no periodic market facility. However, 13 complementary regions of the case study block (including Bhatol and Tulshihata lie outside the study block) are adequately served by it.

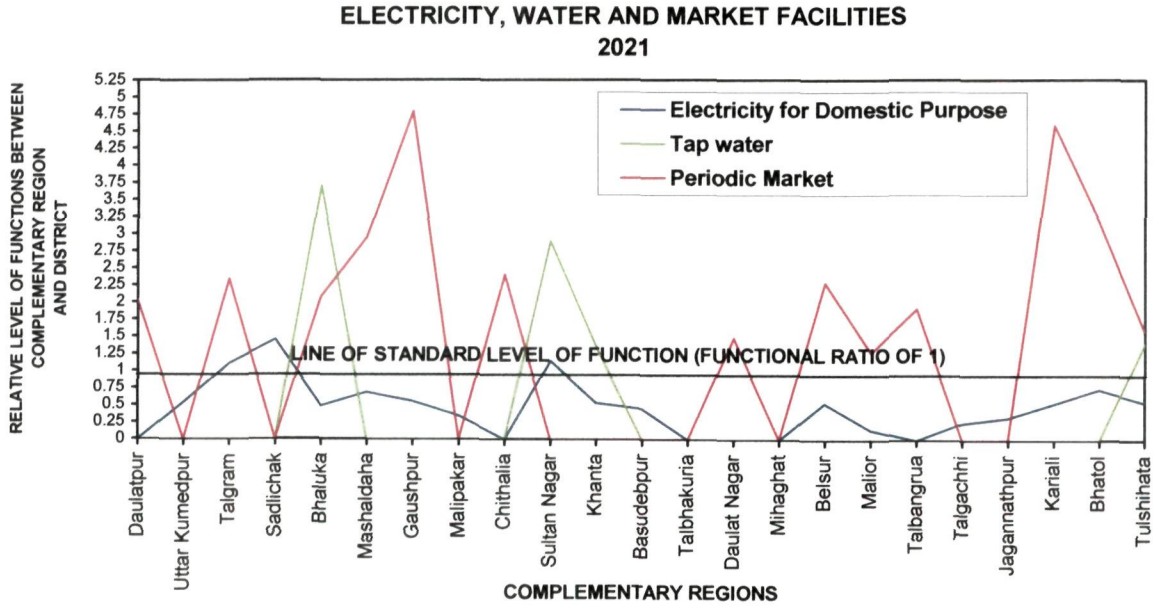
Among the aforementioned existing 14 first order facilities, dispensary and Tap Water are very rarely available to the people in the block. Dispensary is available only in Sultan Nagar and Talbhakuria complementary regions, while tap water facility in Bhaluka, Sultan Nagar and Khanta complementary regions. However, primary school is available in all the complementary regions though a certain functional gap has been estimated in majority of the regions.

Among the 21 complementary regions in the block (excluding Bhatol and Tulshihata lies outside the study block) Jagannathpur, Malipakar and Talbangrua are very poorly served by the socio-economic facilities (Table 8.1).

SPATIO-FUNCTIONAL GAPS OF FIRST ORDER FACILITIES IN THE COMPLEMENTARY REGIONS OF FIRST ORDER CENTRAL PLACES
HARISHCHANDRAPUR-II BLOCK, 2001 AND 2021



a



b

Fig. 8.4

Table 8.2 exhibits the spatio-functional gap of second order facilities within the complementary region of second order central places.

Higher Secondary School

Regarding the existing position of higher secondary school, complementary regions Uttar Kumedpur (1.01), Bhaluka (1.17) and Mashaldaha (1.94) have registered better standard. Rest 03 complementary regions of second order hierarchy namely Daulatpur, Talgram and Sadlichak are not located with this facility (Table 8.2 and Fig. 8.6a).

Primary Health Centre

It is observed that 03 complementary regions i.e., Uttar Kumedpur (1.30), Bhaluka (1.51) and Mashaldaha (2.51) are adequately served by primary health centre, while rest 03 complementary regions i.e. Daulatpur, Talgram and Sadlichak are not having single unit of primary health centre (Table 8.2 and Fig. 8.6a).

Agricultural Seed Distribution Centre

04 complementary regions i.e., Daulatpur (1.23), Uttar Kumedpur (1.55), Sadlichak (3.19) and Bhaluka (1.79) have registered better standard of agricultural seed distribution centre, while rest 02 regions are not having it.

Commercial Bank

Table 8.2 and Figure 8.6a reveals that among six complementary regions of second order hierarchy in the pilot study block, only Mashaldaha is adequately served by commercial bank facility. While, Uttar Kumedpur (0.78) and Bhaluka (0.91) are inadequately served, but Daulatpur, Talgram and Sadlichak have no commercial bank.

Daily Market

Each of the six second order complementary regions are poorly served by daily market facility. Uttar Kumedpur (0.83) and Bhaluka (0.97) complementary regions are inadequately served, but rest 04 complementary regions i.e., Daulatpur, Talgram, Sadlichak and Mashaldaha have no daily market facility (Table 8.2 and Fig. 8.6a).

Public Library

Regarding the functional level of public library facility 03 complementary regions i.e., Daulatpur (1.90), Sadlichak (2.46) and Mashaldaha (1.15) have recorded better standard, while Bhaluka with functional ratio 0.69 shows inadequacy of this

Table 8.2: Spatio-Functional Gaps (according to population) of Second Order Facilities in the Complementary Region of Central Places of Second Order Hierarchy

Harishchandrapur-II Block

(2001)

Complementary Region of Central Place	Higher Secondary School	Primary Health Centre	Agricultural Seed Distribution Centre	Commercial Bank	Daily Market	Public Library	Free Reading Room	Cinema Talkies*	Block Animal health Centre**	Additional Block Animal Centre**	Railway Station**
1. Daulatpur	0	0	1.23	0	0	1.90	1.92	0	0	6.24	0
2. Uttar Kumedpur	1.01	1.30	1.55	0.78	0.83	0	0	0	0	0	2.73
3. Talgram	0	0	0	0	0	0	0	11.32	0	0	16.24
4. Sadlichak	0	0	3.19	0	0	2.46	2.48	0	0	0	0
5. Bhaluka	1.17	1.51	1.79	0.91	0.97	0.69	0.70	0	4.80	0	0
6. Mashaldaha	1.94	2.51	0	1.51	0	1.15	1.16	0	0	0	5.24

Source: Computed by author

*Third order facility and ** Fourth order facilities

facility. However, no public library is available in Uttar Kumedpur and Talgram complementary regions (Table 8.2 and Fig. 8.7a).

Free Reading Room

Like the public library facility, free reading room adequately serves in 03 complementary regions, i.e., Daulatpur (1.92), Sadlichak (2.48) and Mashaldaha (1.16), but inadequately serves in Bhaluka (0.70). No settlement within the complementary region of Uttar Kumedpur and Talgram is located with this facility (Table 8.2 and Fig. 8.7a).

Though the facilities like cinema talkies, block animal health centre, additional block animal health centre and railway station do not come under the second order hierarchy of facilities but have been considered for the present analysis because they are existing in second order central places, and secondly, no third or fourth order central place has been identified in the case study block. The functional level of each of the existing fourth order facilities within the said 06 second order complementary region are given in the Table 8.2 and Figure 8.8a.

Among six complementary regions of second order hierarchy, Talgram is not located with single facility of second order hierarchy but due to having large number of facilities have attained sufficient centrality score to fall under the category of second order hierarchy of central places (App. IV). Bhaluka is located with all of 07 existing second order facilities but the existing position of higher secondary school, primary health centre and agricultural seed distribution centre shows better standard, however, commercial bank, daily market, public library and free reading room facility shows inadequacy suggesting additional unit of these facilities are required to achieve the balanced regional development in the block (Table 8.2).

8.2.2 Estimated Spatio-Functional Gaps in 2021

Spatio-functional gap of facilities likely to exist till 2021 has been estimated on the basis of projected population of each settlement in the block. Projected population of Malda district and Harishchandrapur-II block till 2021 is 4,597,340 persons and 326,139 persons respectively.

Table 8.3 exhibits the estimated adequacy or inadequacy of first order facilities within the complementary region of central places at first order hierarchy till 2021. Due to the estimated increase of population till 2021, the existing functional

Table 8.3: Estimated Spatio-Functional Gaps (according to projected population) of First Order Facilities in the Complementary Region of Central Places of First Order Hierarchy

Harishchandrapur-II Block

(2021)

Complementary Region of Central Place	Primary School	Middle School	Secondary School	Dispen-sary	Branch Post Office	Tele-phone	Fare Bus Stop	Pucca Road	Elec-tricity for Domestic Purpose	Tap water	Electri-city for Agri-culture	Fertilizer Distri-bution centre	Agricul-tural Credit Society	Periodi Market
1. Daulatpur	0.81	0	0	0	2.14	1.19	0.86	0.55	0	0	1.01	2.01	1.90	2.03
2. Uttar Kumedpur	0.92	1.13	0	0	0	1.36	0	0.63	0.54	0	1.15	2.94	2.17	0
3. Talgram	1.12	0	0	0	1.24	2.76	0	0	1.11	0	1.76	0.66	0	2.35
4. Sadlichak	0.99	3.04	2.16	0	1.63	2.73	0	0	1.46	0	2.32	3.52	0	0
5. Bhaluka	1.31	0	0	0	2.18	1.21	1.75	1.13	0.49	3.71	1.04	0.88	1.96	2.09
6. Mashaldaha	0.47	1.44	1.99	0	1.55	0.86	1.24	0.80	0.69	0	0.73	0.42	0	2.95
7. Gaushpur	1.14	0	0	0	2.52	1.41	2.02	2.62	0.56	0	1.19	0	0	4.80
8. Malipakar	0.47	0	0	0	0	0	1.25	0.81	0.35	0	0.74	0	2.79	0
9. Chithalia	0.96	2.36	1.68	0	1.27	0.71	0	1.32	0	0	0	0.68	0	2.41
10. Sultan Nagar	0.91	0.80	1.14	0.68	0.86	1.92	0	0.89	1.15	2.90	1.63	0.69	1.53	0
11. Khanta	0.12	1.50	0	0	0.81	0.45	0	0.42	0.54	1.36	0.38	0	0	0
12. Basudebpur	0.60	0	0	0	2.00	1.12	0	1.04	0.45	0	0	1.08	7.14	0
13. Talbhakuria	0.67	1.03	0	0.87	0	0.62	0	0.57	0	0	0.52	0	1.98	0
14. Daulat Nagar	0.71	0.73	1.04	0	0.78	0.87	0	0.41	0	0	0	0.63	0	1.49
15. Mihaghat	1.51	1.55	0	0	1.67	0.93	1.34	0.86	0	0	0.79	0	0	0
16. Belsur	0.91	1.12	1.60	0	1.21	0.67	0	0	0.54	0	0	0.65	0	2.30
17. Malior	0.61	1.30	1.78	0	0.77	0.37	0	0.35	0.15	0	0	0.36	0	1.28
18. Talbangrua	0.91	1.88	1.34	0	0.99	1.69	0	0	0	0	0	0	0	1.92
19. Talgachhi	0.51	1.05	1.50	0	2.28	1.27	0	0	0.25	0	1.08	0.61	0	0
20. Jagannathpur	0.66	1.36	0	0	1.46	0	0	0.76	0.33	0	0.69	0	0	0
21. Kariali	0.73	0	0	0	2.42	1.35	1.94	1.25	0.54	0	1.14	1.30	0	4.59
22. Bhatol*	0.98	1.55	0	0	1.67	0	0	0.86	0.75	0	0.79	0	0	3.18
23. Tulshihata*	0.99	0.78	1.11	3.96	0	1.40	0.67	0.43	0.56	1.41	1.19	2.92	0	1.59

Source: Computed by author, Note: Computation of functional gap in 2021 is based on projected population; * lies outside the case study area.

gap in 2001 is also estimated to be widened. The estimated increasing functional gap may lead to the decline of level of socio-economic development, if the gaps are not filled by providing additional facilities till the plan period.

Primary School

Due the estimated increase of population till 2021, the relative level of function will show declining from 2001 to 2021 in 15 complementary regions i.e., Daulatpur (0.84 in 2001 to 0.81 in 2021), Uttar Kumedpur (0.94 in 2001 to 0.92 in 2021), Talgram (1.18 to 1.12), Bhaluka (1.32 to 1.31), Gaushpur (1.17 to 1.14), Malipakar (0.48 to 0.47), Sultan Nagar (0.93 to 0.91), Khanta (0.16 to 0.12), Basudebpur (0.62 to 0.60), Talbhakuria (0.68 to 0.67), Mihaghat (1.65 to 1.51), Belsur (0.93 to 0.91), Malior (0.93 to 0.61), Jagannathpur (0.75 to 0.66) and Kariali (0.78 to 0.73). However, due to lesser increase of estimated population in the complementary region than the average increase in the district, functional level will show better standard in 2021 in 08 complementary regions i.e., Sadlichak (0.97 in 2001 to 0.99 in 2021), Mashaldaha (0.42 in 2001 to 0.47 in 2021), Chithalia (0.91 to 0.96), Daulat Nagar (0.66 to 0.71), Talbangrua (0.86 to 0.91), Talgachhi (0.50 to 0.51), Bhatol (0.91 to 0.98) and Tulshihata (0.93 to 0.99). The estimated functional gap suggests the required number of primary school within the complementary region to reach at the balance with the district level till 2021.

Middle School

In the case study block, those complementary regions are located with middle school are estimated to be adequately served except Sultan Nagar (0.80), Daulat Nagar (0.73) and Tulshihata (0.78) which are estimated to show certain functional gap (Table 8.3). Due to higher and lower increase of estimated population in the complementary region than the district average, the functional level of middle school is subject to decrease and increase respectively till 2021 (Table 8.3 and Fig. 8.1a).

Secondary School

There are 12 complementary regions in the case study area, namely Daulatpur, Uttar Kumedpur, Talgram, Bhaluka, Gaushpur, Malipakar, Khanta, Basudebpur, Talbhakuria, Mihaghat, Jagannathpur and Kariali will show complete inadequacy of secondary school (Table 8.3). The complementary regions having this facility are estimated show better standard even after the increase of population till 2021 (Table

8.3 and Fig. 8.1b). Due to the estimated increase of population till 2021, the level of development would decline if no secondary school is provided.

Dispensary

Though only 02 complementary regions i.e., Sultan Nagar (0.70 in 2001 to 0.68 in 2021) and Talbhakuria (0.89 in 2001 to 0.87 in 2021) have dispensary facility but the functional gap is estimated to be widening till 2021 than that in 2001 (Table 8.3 and Fig. 8.2b). Rest 20 complementary regions will show complete inadequacy having no dispensary facility (Table 8.3). If this facility is not provided, the level of development would be declining as much as population will increase.

Branch Post Office

There are 08 complementary regions i.e., Uttar Kumedpur, Malipakar, Sultan Nagar, Khanta, Talbhakuria, Daulat Nagar, Malior and Talbangrua in the block likely to be registering inadequacy of the branch post office facility till 2021 (Table 8.3 and Fig. 8.3b).

Telephone

Regarding telephone facility in the block, a certain functional gap is expected to exist in the complementary region of Mashaldaha, Malipakar, Chithalia, Khanta, Talbhakuria, Daulat Nagar, Mihaghat, Belsur, Malior and Jagannathpur. Mihaghat was adequately served (1.02) during 2001 (Table 8.1), but due to the increase of estimated population during 2001 to 2021 it is likely to serve inadequately with functional ratio 0.93 in 2021 (Table 8.3). Due to the same factor, functional gap is expected to be widening in Khanta (0.50 in 2001 and 0.45 in 2021), Talbhakuria (0.63 in 2001 and 0.62 in 2021), Belsur (0.69 in 2001 and 0.71 in 2021) and Malior (0.57 in 2001 and 0.37 in 2021) complementary regions in the block (Table 8.3 and Fig. 8.3b).

Fare Bus Stop

14 complementary regions i.e., Uttar Kumedpur, Talgram, Sadlichak, Chithalia, Sultan Nagar, Khanta, Basudebpur, Talbhakuria, Daulat Nagar, Belsur, Malior, Talbangrua, Talgachhi and Jagannathpur will show complete inadequacy having no fare bus stop facility (Table 8.3). Functional ration of 0.89 in 2001 is estimated to stand at 0.86 till 2021 in Daulatpur complementary region (Table 8.3 and Fig. 8.3b). If no fare bus stop is provided in these regions, the level of transportation development would be declining as much as with the increase of population.

Pucca Road

The block is poorly served by the pucca road facility. Only five complementary regions i.e., Bhaluka, Gaushpur, Chithalia, Basudebpur and Kariali are estimated to show better standard of this facility (Table 8.3). Due to increase of estimated population, the functional gap is also estimated to be widening till 2021 in 09 complementary regions i.e., Daulatpur (0.58 in 2001 to 0.55 in 2021), Uttar Kumedpur (0.65 in 2001 to 0.63 in 2021), Malipakar (0.83 to 0.81), Sultan Nagar (0.91 to 0.89), Khanta (0.46 to 0.42), Talbhakuria (0.59 to 0.57), Mihaghat (0.94 to 0.86), Malior (0.53 to 0.35) and Jagannathpur (0.86 to 0.76).

Electricity for Domestic Purpose

Except 03 complementary regions namely Talgram, Sadlichak and Sultan Nagar which are adequately served all the complementary regions are expected to show certain functional gap till 2021 if it is not provided in new settlements (Table 8.3).

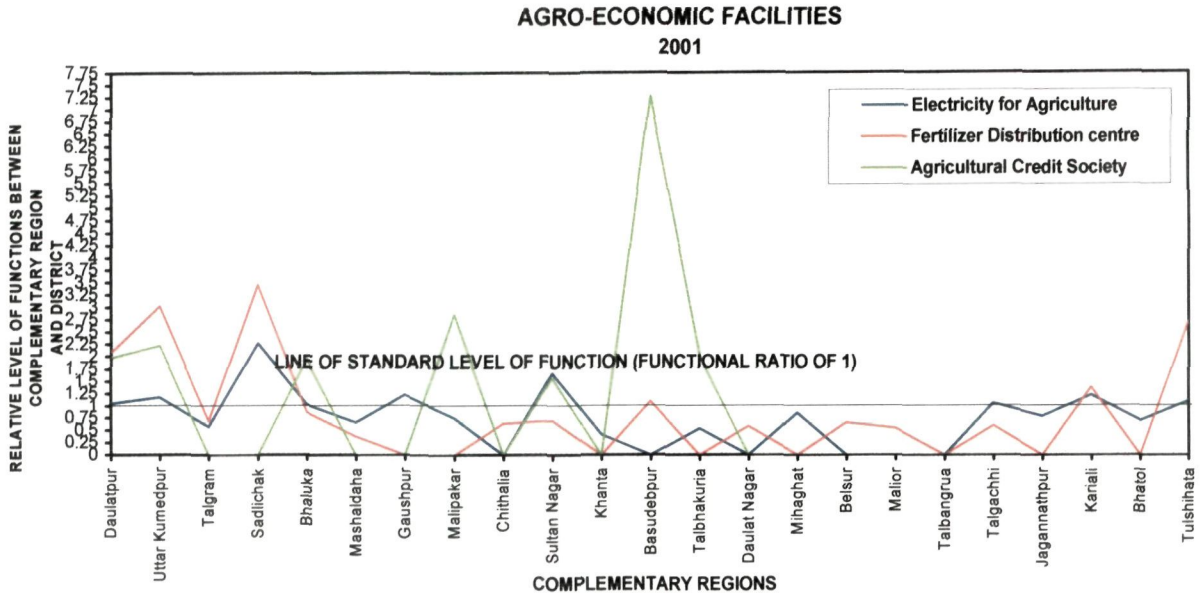
Tap Water

02 complementary regions i.e., Bhaluka and Tulshihata are expected to show better standards of tap water facility in the year 2021 than that in 2001. In the year 2001 functional ratio was recorded at 3.70 in Bhaluka and 1.31 in Tulshihata while their ratio is estimated to be 3.71 and 1.41 respectively, though their projected population shows certain positive growth. This significant figure is due to the lesser increase of population estimated to be recorded in these complementary regions than the district average increase during 2001-2021. However, declining standard of tap water has been estimated in 02 complementary regions i.e., Sultan Nagar (2.98 in 2001 to 2.90 in 2021) and Khanta (1.51 in 2001 to 1.36 in 2021) because of higher increase of estimated population here than the district average increase (Table 8.1 and 8.3 and Fig. 8.4). But the facility will serve adequately in these regions till 2021.

Electricity for Agriculture

Regarding the facility of electricity for agriculture, inadequacy of function will remain continued till 2021 in Khanta (0.38), Talbhakuria (0.52), Mashaldaha (0.73), Jagannathpur (0.69), Malipakar (0.74), Bhatol (0.79) and Mihaghat (0.79) complementary regions in the block (Table 8.3 and Fig. 8.5b).

SPATIO-FUNCTIONAL GAP OF FIRST ORDER FACILITIES IN THE COMPLEMENTARY REGION OF FIRST ORDER CENTRAL PLACES
HARISHCHANDRAPUR-II BLOCK, 2001 AND 2021



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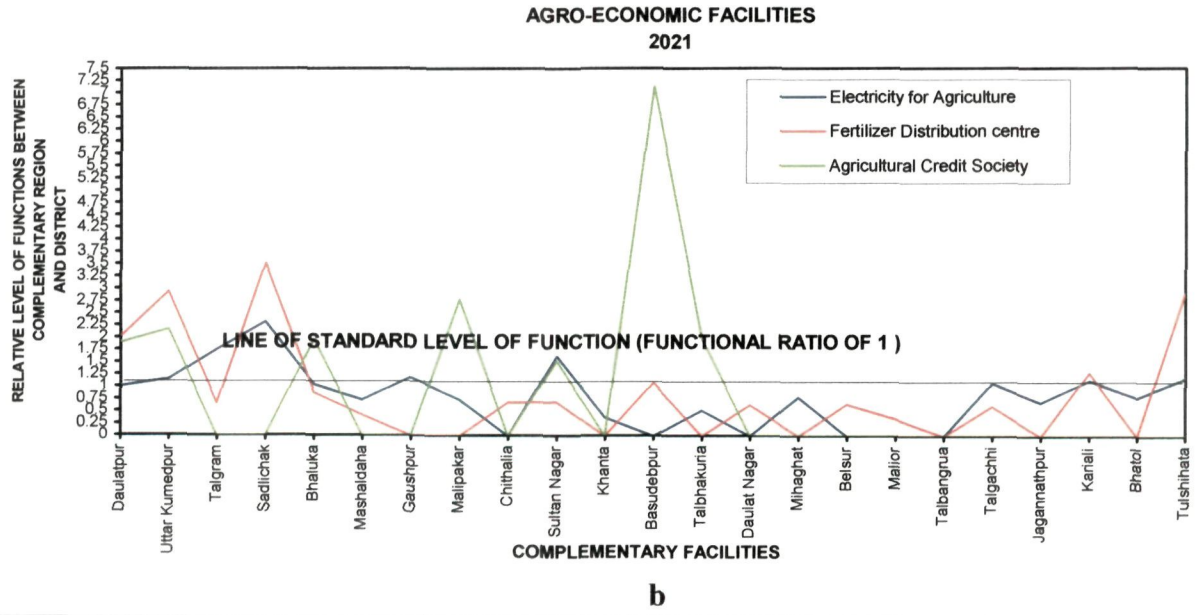

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Fig. 8.5

Fertilizer Distribution Centre

Table 8.3 and Figure 8.5 depict that in the block, only five complementary regions are estimated to show better standard of fertilizer distribution centre are Daulatpur (2.01), Uttar Kumedpur (2.94), Sadlichak (3.52), Basudebpur (1.08) and Kariali (1.30). 09 complementary regions in the block are estimated to show inadequacy of this function till 2021 are Talgram (0.66), Bhaluka (0.88), Mashaldaha (0.42), Chithalia (0.68), Sultan Nagar (0.69), Daulat Nagar (0.63), Belsur (0.65), Malior (0.36) and Talgachhi (0.61) (Table 8.3 and Fig. 8.5b).

Agricultural Credit Society

Due to estimated increase of population higher than the district average, the functional ratio of agricultural credit society is expected to show declining till 2021 in 06 complementary regions i.e., Daulatpur (1.98 in 2001 to 1.90 in 2021), Uttar Kumedpur (2.23 in 2001 to 2.17 in 2021), Malipakar (2.86 in 2001 to 2.79 in 2021), Sultan Nagar (1.57 in 2001 to 1.53 in 2021), Basudebpur (7.28 in 2001 to 7.14 in 2021) and Talbhakuria (2.02 in 2001 to 1.98 in 2021). Bhaluka is estimated to show better standard of this facility in 2021 (1.96) than that in 2001 (1.95) (Table 8.1 and 8.3).

Periodic Market

Table 8.1 and 8.3 reveal that 06 complementary regions expected to show declining functional ratio of periodic market facility in 2021 from that in 2001 are Daulatpur (2.12 in 2001 to 2.03 in 2021), Talgram (2.47 in 2001 to 2.35 in 2021), Gaushpur (4.93 in 2001 to 4.80 in 2021), Belsur (2.35 in 2001 to 2.30 in 2021); Malior (1.96 in 2001 to 1.28 in 2021) and Kariali (4.89 in 2001 to 4.59 in 2021). However, due to lesser increase of population than average increase in the district 07 complementary regions i.e., Bhaluka, Mashaldaha, Chithalia, Daulat Nagar, Talbangrua, Bhatol and Tulshihata are estimated to show better level of this function in 2021 than that in 2001 (Table 8.1 and 8.3 and Fig. 8.4b).

Table 8.4 reveals the relative level of second order facilities expected to exist in 2021 in the complementary region of second order central places.

Higher Secondary School

Regarding the higher secondary school, due to expected increase of population Uttar Kumedpur complementary region is estimated to inadequately served with

Table 8.4: Estimated Spatio-Functional Gaps (according to projected population) of Second Order Facilities in the Complementary Region of Central Places of Second Order Hierarchy

Harishchandrapur-II Block

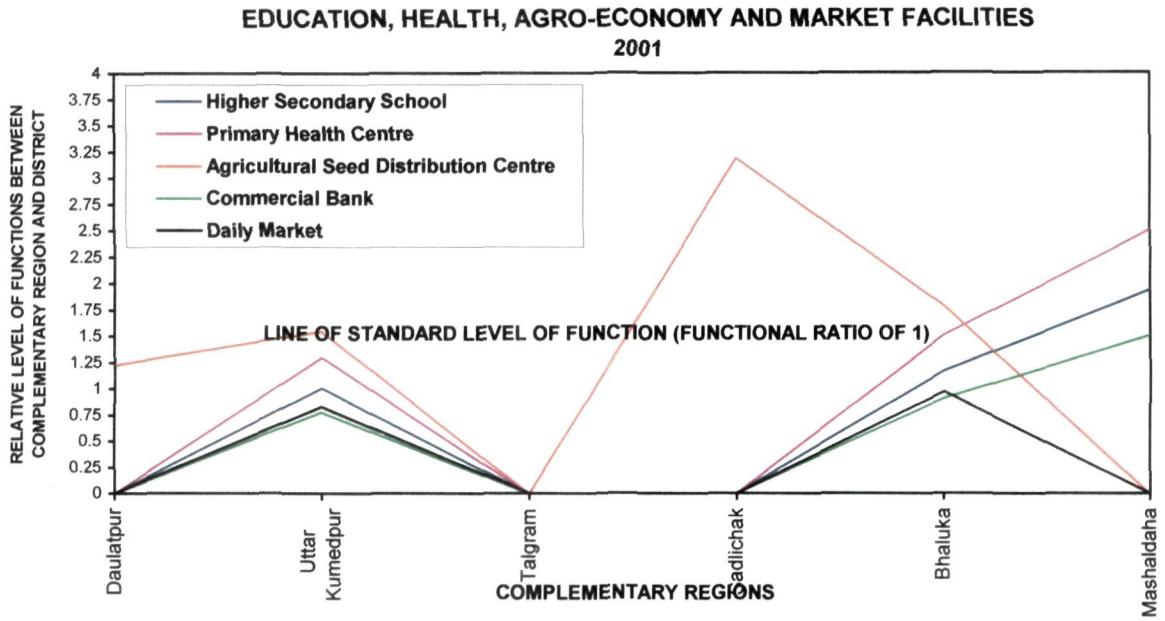
(2021)

Complementary Region of Central Place	Higher Secondary School	Primary Health Centre	Agricultural Seed Distribution Centre	Commercial Bank	Daily Market	Public Library	Free Reading Room	Cinema Talkies*	Block Animal Health Centre**	Additional Block Animal Centre**	Railway Station**
1. Daulatpur	0	0	1.24	0	0	1.91	1.93	0	0	6.28	0
2. Uttar Kumedpur	0.88	1.13	1.34	0.68	0.72	0	0	0	0	0	2.36
3. Talgram	0	0	0	0	0	0	0	10.77	0	0	15.45
4. Sadlichak	0	0	3.19	0	0	2.46	2.46	0	0	0	0
5. Bhaluka	1.17	1.51	1.79	0.91	0.97	0.69	0.69	0	4.83	0	0
6. Mashaldaha	1.98	2.56	0	1.54	0	1.16	1.17	0	0	0	5.35

Source: Computed by author

*Third order function and ** Fourth order functions.

SPATIO-FUNCTIONAL GAP OF SECOND ORDER FACILITIES IN THE COMPLEMENTARY REGION OF SECOND ORDER CENTRAL PLACES
HARISHCHANDRAPUR-II BLOCK, 2001 AND 2021



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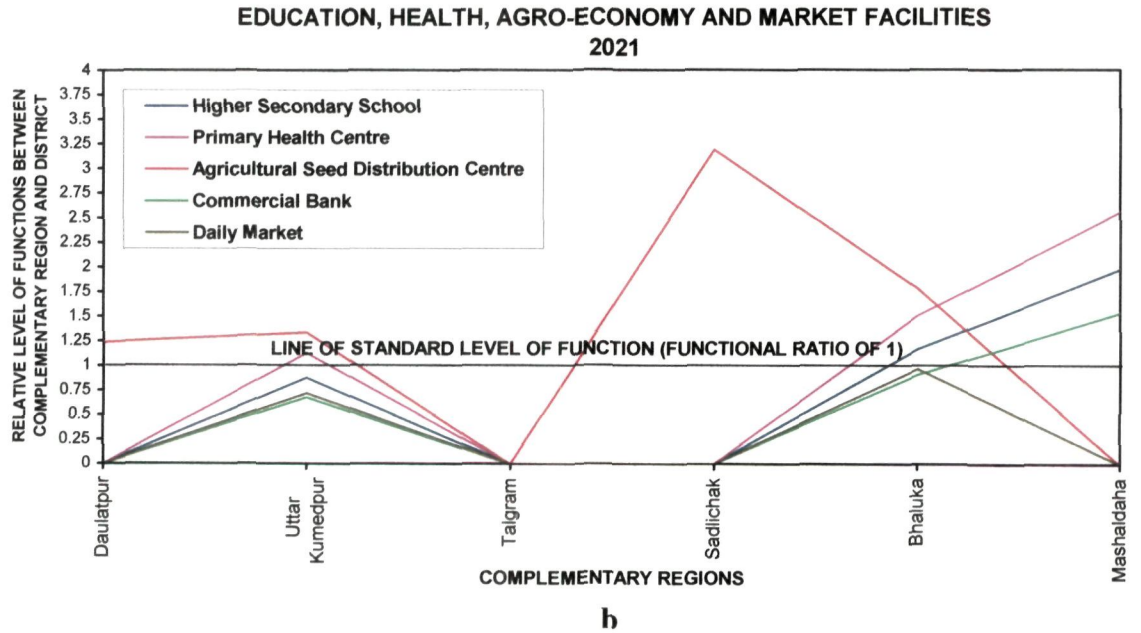


b

Fig. 8.6

functional ratio 0.88 in 2021 from its better standard with that 1.01 in 2001. Relative level of this facility may remain same in 2021 (1.17) as in 2001 (1.17) in Bhaluka complementary region. Mashaldaha is estimated to show much better level in 2021 (1.98) than that in 2001 (1.94) (Table 8.2 and 8.4 and Fig. 8.6).

Primary Health Centre

The analysis reveals that the functional level of primary health centre is estimated to decline from 1.30 in 2001 to 1.13 in 2021 though it will serve adequately in Uttar Kumedpur (Table 8.2 and 8.4 and Fig. 8.6). However, Daulatpur, Talgram and Sadlichak will remain without any unit of this facility if it is not provided during the plan period and consequently the level of health development would be declining with increase of population (Table 8.4).

Agricultural Seed Distribution Centre

Though agricultural seed distribution centre will serve adequately, its functional level is estimated to decline from 1.55 in 2001 to 1.34 in 2021 in Uttar Kumedpur complementary region due to higher increase of estimated population than average increase in the district.

Commercial Bank

Complete inadequacy of commercial bank facility will remain till 2021 in Daulatpur, Talgram and Sadlichak complementary regions if no unit is provided till the plan period. It may lead to decline the level of financial development with the increase of population. In Uttar Kumedpur the functional gap expected to increase from 0.78 in 2001 to 0.68 till 2021 (Table 8.2 and 8.4 and Fig. 8.6).

Daily Market

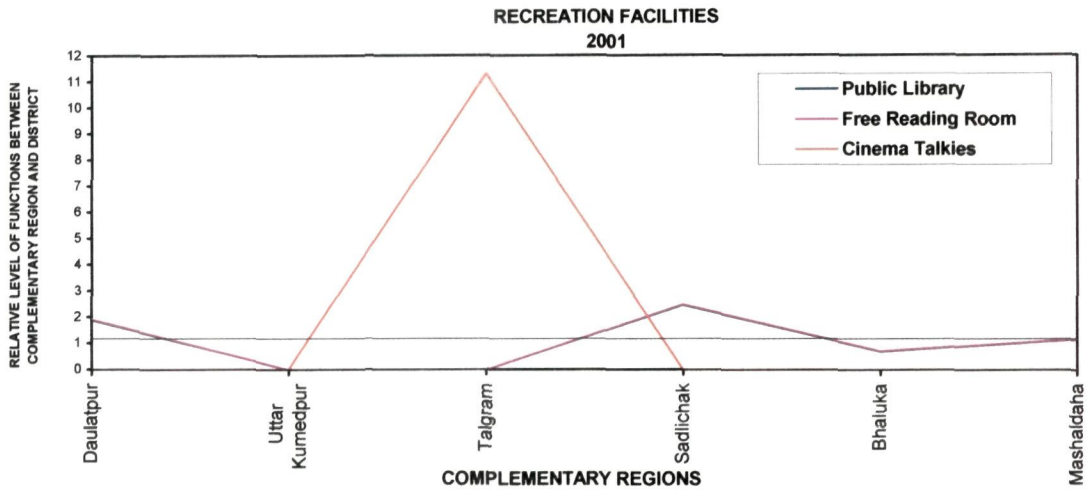
Though, only two complementary regions i.e. Uttar Kumedpur and Bhaluka have daily market facility, but due to increase of estimated population the functional gap is estimated to incline sharply at 0.72 in 2021 from 0.83 in 2001 in Uttar Kumedpur, but it will remain same in 2021 (0.97) as in 2001 (0.97) in Bhaluka complementary region (Table 8.2 and 8.4 and Fig. 8.6).

Public Library

As far as the relative functional level of public library is concerned a certain functional gap is expected to exist in Bhaluka complementary region with functional ratio 0.69 in 2021 (Table 8.4 and Fig. 8.7b). Till 2021, this facility is estimated to

SPATIO-FUNCTIONAL GAPS OF SECOND ORDER FACILITIES IN THE COMPLEMENTARY REGIONS OF SECOND ORDER CENTRAL PLACES

HARISHCHANDRAPUR-II BLOCK, 2001 AND 2021



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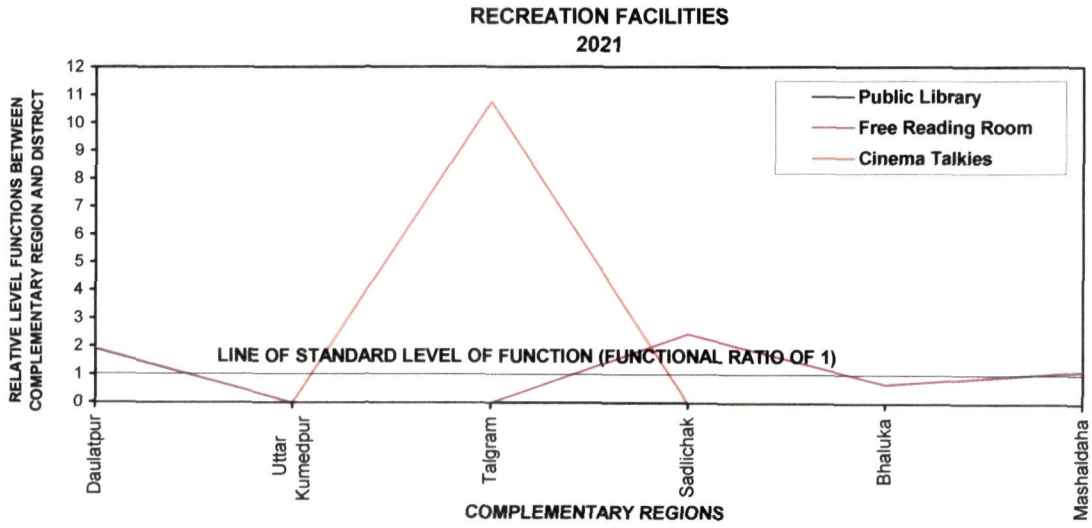

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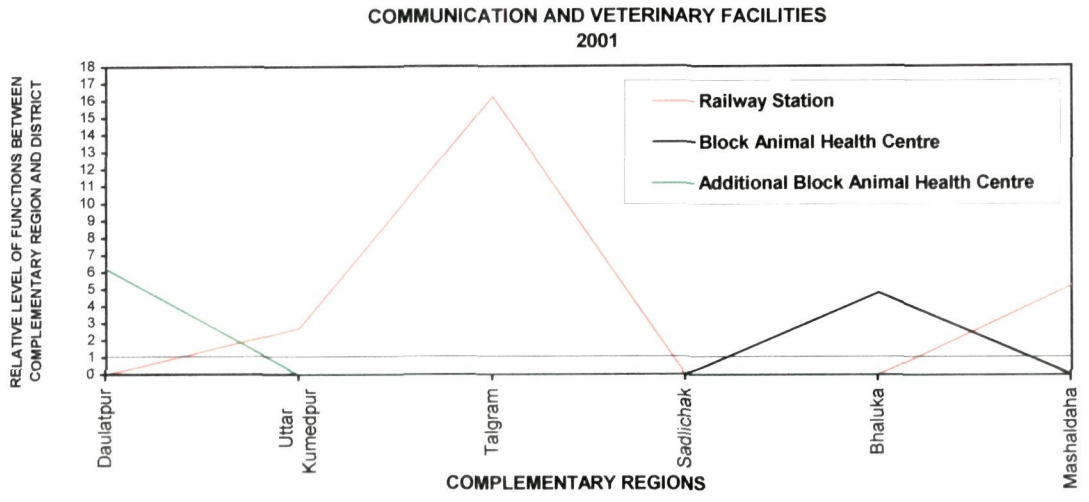
Fig. 8.7

SPATIO-FUNCTIONAL GAPS OF FOURTH ORDER FACILITIES IN THE COMPLEMENTARY REGIONS OF SECOND ORDER CENTRAL PLACES

HARISHCHANDRAPUR-II BLOCK, 2001 AND 2021



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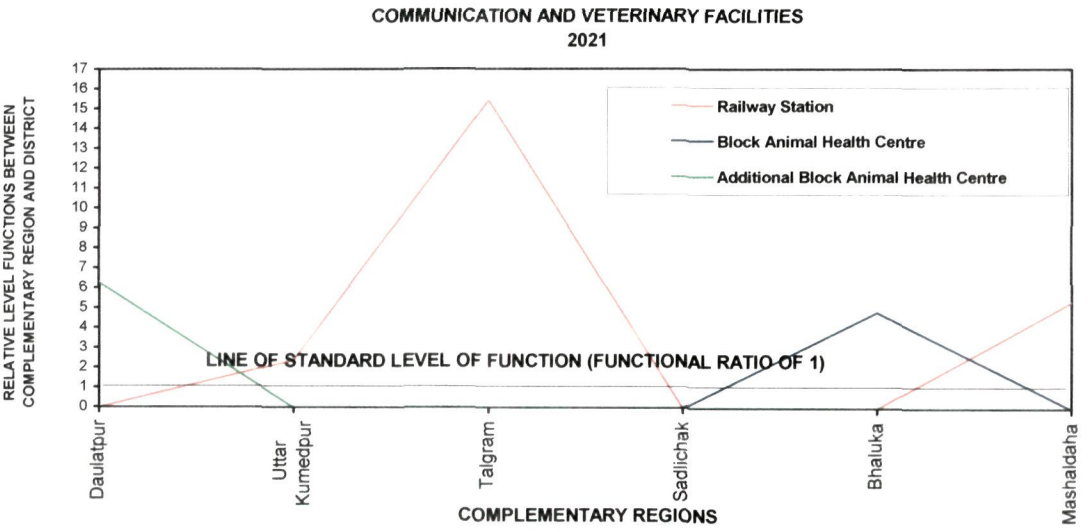

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Fig. 8.8

serve adequately in the complementary regions of Daulatpur (1.90 in 2001 to 1.91 in 2021) and Mashaldaha (1.15 in 2001 to 1.16 in 2021).

Free Reading Room

Table 8.4 and Figure 8.7 reveal that the relative level of free reading room is estimated to decline from 0.70 in 2001 to 0.69 in 2021 in the complementary region of Bhaluka. Again it is estimated to serve adequately in 2021 in Daulatpur, Sadlichak and Mashaldaha regions with functional ratio 1.93, 2.46 and 1.17 respectively (Table 8.4 and Fig. 8.7b).

After the foregoing analysis it is revealed that due to the increase of estimated population till 2021 from that of 2001, the relative level of function would subject to decrease in the complementary region. Subsequently, the level of socio-economic development of the inhabitants would decline if facility is not provided in proportion to the increase of population.

The identification of functional gap of facilities is very significant in formulation of planning for balanced regional development. It gives better idea of whether the complementary region is inadequately served by the existing facilities or inadequately served scoring. Besides, the estimated functional ratio is likely to exist till 2021 suggests a planner or policy maker to determine the actual number of facility to be required to bring a complementary region in balance to the district level. Therefore, the planning goal of balanced regional development would be achieved.

But, for a geographer the identification of functional gaps and determination of required facilities is not the end formulate a pragmatic model of micro-level planning. The main problem comes to the forefront of geographers is the determination of actual location of the required facilities, so that it would be available to the maximum population within the minimum traveling distance.

8.3 DIAGNOSTIC PLANNING PROPOSAL

The proposal of facilities is based on the identification of existing problems and problems likely to exist in future. The adoption of micro-level planning or the bottom-up approach of planning has a great significance to eliminate the regional problem and to achieve the balanced regional development. In view of this, the present section is an endeavor to propose a micro-level planning model for the plan period till 2021. The proposed planning model comprises two folds, i.e., first,

determination of required number of facilities, and second, determination of optimal location (settlement) for the required facilities. The diagnostic planning model has been proposed for Harishchandrapur-II block.

8.3.1 Proposed Facilities for the Plan Period till 2021

The proposed facilities have been estimated as the requirement to fill the identified functional gap likely to exist within the complementary regions till 2021 (Table 8.3 and 8.4).

Table 8.5 exhibits the number of existing first order facilities in the complementary region of first order central places in 2001 and their proposed number for the plan period till 2021. The same table (Table 8.5) presents the proposal of only those facilities that exist in 2001 in the case study block.

To keep pace with growth of population and to fill the estimated functional gap, 37 primary schools in addition to existing number will be required till 2021 in the block. Highest 07 primary schools have been proposed for the complementary region Khanta. Not a single new unit of primary school has been proposed for the complementary regions of Talgram, Sadlichak, Bhaluka, Goushpur, Mihaghat and Bhatol (Table 8.5). 04 new middle schools have been proposed for 04 complementary regions i.e., Daulatpur, Talgram, Bhaluka and Sultan Nagar in the block. However, only 01 new secondary school has been proposed for the complementary region of Khanta (Table 8.5).

To overcome the problem of lack of availability of medical and health care facilities in the case study block, in addition to existing 02 dispensaries (excluding 06 dispensaries in Tulshihata) 18 more (excluding 01 in complementary region Bhatol lies outside the study block) dispensaries have been proposed for the plan period till 2021. No unit of this facility has been proposed for the complementary regions of Gaushpur, Sultan Nagar, Basudebpur, Talbhakuria, Mihaghat, Kariali and Tulshihata (Table 8.5).

In addition to existing 22 units of branch post offices (including 01 in Bhatol complementary region) 03 more units (including 01 in Tulshihata complementary region) would be required till 2021 in the case study block. 01 branch post office has been proposed for each complementary region of Uttar Kumedpur, Talbhakuria and Tulshihata.

Table 8.5: Proposed Facilities (1st Order) for the Complementary Region of Central Places of First Order Hierarchy

Harishchandrapur-II Block

(2021)

Sl. No.	Complementary Region of Central Place	Primary School		Middle School		Secondary School		Dispensary	
		Existing units in 2001	Proposed units for 2021	Existing units in 2001	Proposed units for 2021	Existing units in 2001	Proposed units for 2021	Existing units in 2001	Proposed units for 2021
1	Daulatpur	05	02	0	01	0	0	0	02
2	Uttar Kumedpur	05	01	01	0	0	0	0	01
3	Talgram	06	0	0	01	0	0	0	01
4	Sadhichak	04	0	02	0	01	0	0	01
5	Bhaluka	08	0	0	01	0	0	0	01
6	Mashaldaha	02	03	01	0	01	0	0	01
7	Goushpur	03	0	0	0	0	0	0	0
8	Malipakar	02	03	0	0	0	0	0	01
9	Chithalia	05	01	02	0	01	0	0	01
10	Sultan Nagar	07	01	01	01	01	0	01	01
11	Khanta	01	07	02	0	0	01	0	01
12	Basudebpur	02	02	0	0	0	0	0	0
13	Talbhakuria	04	02	01	0	0	0	01	0
14	Daulat Nagar	06	03	01	0	01	0	0	02
15	Mihaghat	06	0	01	0	0	0	0	0
16	Belsur	05	01	01	0	01	0	0	01
17	Malior	06	03	02	0	02	0	0	01
18	Talbangrua	06	01	02	0	01	0	0	01
19	Talgachhi	03	03	01	0	01	0	0	01
20	Jagannathpur	03	02	01	0	0	0	0	01
21	Kariali	02	01	0	0	0	0	0	0
22	Bhatol*	04	0	01	0	0	0	0	01
23	Tulshihata*	08	01	01	0	01	0	06	0
	Total	103	37	21	04	11	01	08	19

Contd...

Sl. No.	Complementary Region of Central Place	Branch Post Office		Telephone		Fare Bus Stop		Pucca Road	
		Existing units in 2001	Proposed units for 2021	Existing sett. in 2001	Proposed sett. for 2021	Existing units in 2001	Proposed units for 2021	Existing sett. in 2001	Proposed sett. for 2021
1	Daulatpur	02	0	02	0	01	0	01	01
2	Uttar Kumedpur	0	01	02	0	0	01	01	01
3	Talgram	01	0	04	0	0	01	0	02
4	Sadlichak	01	0	03	0	0	0	0	01
5	Bhaluka	02	0	02	0	02	0	02	01
6	Mashaldaha	01	0	01	0	01	0	01	0
7	Goushpur	01	0	01	0	01	0	02	0
8	Malipakar	0	0	0	01	01	0	01	0
9	Chithalia	01	0	01	01	0	01	02	0
10	Sultan Nagar	01	0	04	0	0	01	02	0
11	Khanta	01	0	01	01	0	01	01	01
12	Basudebpur	01	0	01	0	0	0	01	0
13	Talbhakuria	0	01	01	01	0	01	01	01
14	Daulat Nagar	01	0	02	01	0	01	01	01
15	Mihaghat	01	0	01	0	01	0	01	0
16	Belsur	01	0	01	01	0	01	0	02
17	Malior	01	0	01	02	0	01	01	02
18	Talbangrua	01	0	02	0	0	01	0	02
19	Talgachhi	02	0	02	0	0	01	0	02
20	Jagannathpur	01	0	0	01	0	01	01	0
21	Kariali	01	0	01	0	01	0	01	0
22	Bhatol*	01	0	0	01	0	0	01	0
23	Tulshihata*	0	01	03	0	01	0	01	02
	Total	22	03	36	10	09	12	22	19

Contd...

Sl. No.	Complementary Region of Central Place	Electricity for Domestic Purpose		Tap water		Electricity for Agriculture		Fertilizer Distribution Centre	
		Existing sett in 2001	Proposed sett for 2021	Existing sett in 2001	Proposed sett for 2021	Existing sett in 2001	Proposed sett for 2021	Existing units in 2001	Proposed units for 2021
1	Daulatpur	0	02	0	01	02	0	07	0
2	Uttar Kumedpur	02	01	0	01	02	0	09	0
3	Talgram	04	0	0	01	03	0	02	01
4	Sadlichak	04	0	0	0	03	0	08	0
5	Bhaluka	02	01	02	0	02	0	03	01
6	Mashaldaha	02	0	0	01	01	0	01	02
7	Goushpur	01	01	0	0	01	0	0	01
8	Malipakar	01	0	0	0	01	0	0	02
9	Chithalia	0	04	0	0	0	02	02	01
10	Sultan Nagar	06	0	02	01	04	0	03	01
11	Khanta	03	01	01	01	01	01	0	05
12	Basudebpur	01	01	0	0	0	01	02	0
13	Talbhakuria	0	03	0	0	01	01	0	04
14	Daulat Nagar	0	03	0	01	0	03	03	02
15	Mihaghat	0	02	0	0	01	0	0	02
16	Belsur	02	0	0	0	0	02	02	01
17	Malior	01	03	0	01	0	03	02	03
18	Talbangrua	0	01	0	0	0	02	0	04
19	Talgachhi	01	02	0	0	02	0	02	01
20	Jagannathpur	01	01	0	0	01	0	0	02
21	Karialı	01	0	0	0	01	0	02	0
22	Bhatol*	02	01	0	0	01	0	0	02
23	Tulshihata*	03	03	01	0	03	0	13	0
	Total	37	29	06	08	30	15	61	35

Contd..

Sl. No.	Complementary Region of Central Place	Agricultural Credit Society		Periodic Market	
		Existing units in 2001	Proposed units for 2021	Existing units in 2001	Proposed units for 2021
1	Daulatpur	01	0	01	0
2	Uttar Kumedpur	01	0	0	0
3	Talgram	0	0	01	0
4	Sadlichak	0	0	0	0
5	Bhaluka	01	0	01	0
6	Mashaldaha	0	0	01	0
7	Goushpur	0	0	01	0
8	Malipakar	01	0	0	0
9	Chithalia	0	0	01	0
10	Sultan Nagar	01	0	0	0
11	Khanta	0	01	0	01
12	Basudebpur	02	0	0	0
13	Talbhakuria	01	0	0	0
14	Daulat Nagar	0	0	01	0
15	Mihaghat	0	0	0	0
16	Belsur	0	0	01	0
17	Malior	0	01	01	0
18	Talbangrua	0	0	01	0
19	Talgachhi	0	0	0	0
20	Jagannathpur	0	0	0	0
21	Kariali	0	0	01	0
22	Bhatol*	0	0	01	0
23	Tulshihata*	0	01	01	0
	Total	08	03	13	01

Source: Computed and compiled by author.

*Lies outside the case study area

Sett.- refers to Settlement (i.e., existing and proposed number of settlements with function)

Regarding the telephone facility, in addition to 36 settlements (including 03 settlements in Tulshihata complementary region), 10 more new settlements have been recommended to have this facility to achieve balanced regional development in the district till 2021. This facility has been proposed for 01 settlement of each complementary region of Malipakar, Chithalia, Khanta, Talbhakuria, Daulat Nagar, Belsur, Jagannathpur and Bhatol. However, this facility has been proposed for 02 settlements of the complementary region of Malior (Table 8.5).

In addition to existing 09 fare bus stops (including 01 in Tulshihata) 12 more new fare bus stop would be required in accordance to the estimated increase of population till 2021 to establish an efficient transportation network in the block. However, in addition to existing pucca road facility in 22 settlements (including Bhatol and Tulshihata) 19 more settlements have been recommended for this facility to achieve balanced a regional development till the plan period (Table 8.5).

Regarding the facility of electricity for domestic purpose, in addition to 37 settlements having it, 29 more settlements have been recommended to avail this facility. In addition to existing 06 settlements having tap water facility, 08 more new settlements have been suggested for it. The tap water facility has been proposed for one settlement of each complementary region of Daulat Nagar, Daulatpur, Uttar Kumedpur, Talgram, Mashaldaha, Sultan Nagar, Khanta and Malior (Table 8.5).

Among the agro-economic facilities, electricity for agriculture has been proposed for 15 more settlements in addition to existing 30 settlements, while in addition to existing 61 units of fertilizer distribution centres 35 new units would be required to achieve a balanced regional development till 2021. However, 03 more new units of agricultural credit societies have been proposed in addition to existing 08 units. The new units of agricultural credit society have been proposed for one settlement of each complementary region of Khanta, Malior and Tulshihata.

01 new primary periodic market has been recommended for Khanta complementary region (Table 8.5). However, the settlement of the rest complementary regions would have no sufficient population to sustain a location (threshold population) of periodic market. Therefore, not a single new unit of this

facility has been proposed for other complementary regions than Khanta in the block (Table 8.5).

It is interesting to note that, even after the estimated increase of population, the complementary regions located with periodic market facility is estimated to be adequately served till 2021. In such cases, if a new facility is recommended to locate then the relative level (or, ratio of function between complementary region and entire district) would become higher than the standard level (or, ratio of 01) which may lead further regional imbalances instead of the achieving the balanced regional development in the district.

Table 8.6 exhibits the existing and proposed number of second order facilities within the complementary region of second order central places in Harishchandrapur-II block. The same table (Table 8.6) reveals that, no unit of higher secondary school, primary health centre, commercial bank, agricultural seed distribution centre, cinema talkies (3^{rd} order function), block animal health centre (4^{th} order function), additional block animal health centre (4^{th} order function) and railway station have been proposed till the plan period 2021. It is because, no settlement of the block will have threshold population to sustain the location of such higher order functions.

In addition to existing facilities 01 daily market, 01 public library and 01 free reading room have been proposed for different complementary regions in the block (Table 8.6).

Thus, socio-economic facilities have been proposed for spatial planning in the case study block after estimating their functional gap likely to exist in 2021. This will help in achieving the balanced regional development. If the proposed facilities are not provided, the functional gap will become widening year after year. Consequently, regional imbalances will become more intensive and hard to remove in future and the socio-economic life of inhabitants and their standard of living will start moving down with the passage of time as well as with the fast increase of population.

It is important to note that the required number of facilities have been proposed to achieve the balanced standard of functional level of each facility till 2021 under the condition of static number of facilities existing in 2001. If further more facilities are being provided in any settlement other than the case study block then the standard level of function will be disturbed. To avoid such problem, a rational

Table 8.6: Proposed Facilities (2nd Order) for the Complementary Region of Central Places of Second Order Hierarchy

Harishchandrapur-II Block

(2021)

Sl. No.	Complementary Region of Central Place	Higher Secondary		Primary Health Centre		Agricultural Seed Distribution Centre		Commercial Bank		Daily Market	
		Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021
1.	Daulatpur	0	0	0	0	01	0	0	0	0	01
2.	Uttar Kumedpur	01	0	01	0	02	0	01	0	01	0
3.	Talgram	0	0	0	0	0	0	0	0	0	0
4.	Sadlichak	0	0	0	0	01	0	0	0	0	0
5.	Bhaluka	01	0	01	0	02	0	01	0	01	0
6.	Mashaldaha	01	0	01	0	0	0	01	0	0	0
	Total	03	0	03	0	06	0	03	0	02	01

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Sl. No.	Complementary Region of Central Place	Public Library		Free Reading Room		Cinema Talkies*		Block Animal Health Centre**		Additional Block Animal Health Centre**		Railway Station**	
		Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021	Existing Units in 2001	Proposed unit for 2021
1.	Daulatpur	02	0	02	0	0	0	0	0	01	0	0	0
2.	Uttar Kumedpur	0	01	0	01	0	0	0	0	0	0	01	0
3.	Talgram	0	0	0	0	01	0	0	0	0	0	01	0
4.	Sadlichak	01	0	01	0	0	0	0	0	0	0	0	0
5.	Bhaluka	01	0	01	0	0	0	01	0	0	0	0	0
6.	Mashaldaha	01	0	01	0	0	0	0	0	0	0	01	0
	Total	05	01	05	01	01	0	01	0	01	0	03	0

Source: Computed and compiled by author
*Third order facility and ** Fourth order facilities.

thinking should be kept in mind to provide an equal opportunity to Harishchandrapur-II block while allocating resources for other blocks.

8.3.2 Determination of Optimal Location for Facilities till Plan Period 2021

After analysing the requirement of additional socio-economic facilities within the complementary region, their optimal new locations have been determined based on priority assessment. Each of the proposed settlement is supposed to have the given facility, if it has population more than the computed Median Population Threshold (MPT) of the concerned facility. After identifying the settlements with MPT value, based on the priority in terms of absolute population settlement, nearest neighbour distance, connectivity and accessibility indices the optimal location for proposed facilities has been determined. The clustering or nearest neighbour distance of settlements has been given emphasis in order to have services and facilities available to the maximum population within minimum traveling distance.

Table 8.7 and Figures 8.9 – 8.18 depicts the identified new locations for proposed facilities in the case study block. It is also depicted from the same table that, due to having no big size of settlement (in term of population) with MPT, no higher order facility has been proposed in the block. In case of the facility of primary health sub centre, not a single unit exists (2001) but has been proposed for those settlements that have MPT to sustain its location and is centrally located with better communication facility. In case of two complementary regions namely Bhatol and Tulshihata which lies outside the study block, the functional gap has been identified in terms of its total dependent population (dependent population of both blocks, i.e., Harishchandrapur-I and Harishchandrapur-II) and required facilities has been determined based on it. For the proposal of new location in these two complementary regions, only the settlements of pilot study area has been identified as new site if it is considered as the optimal location with MPT of concerned facility, and has been mentioned in the table 8.7. Such situation is observed in case of the facilities of dispensary, telephone, electricity for domestic purpose, pucca road and fertilizer distribution centre. For instance 01 unit of dispensary and 01 settlement with telephone facility have been recommended for the complementary region of Bhatol, but the settlement as optimal location for both the facilities are not identified in the case study block, hence 20 units of dispensary in 17 new locations and 09 new settlements for telephone facility have been mentioned in the Table 8.7. In case of

settlements for telephone facility have been mentioned in the Table 8.7. In case of facilities of electricity for domestic purpose and pucca road, 03 new settlements and 02 new settlements have been recommended respectively for the complementary region of Tulshihata, but 01 settlement for electricity for domestic purpose and 01 settlement for pucca road facility have been identified from the case study block. Two fertilizer distribution centres have been suggested for the complementary region of Bhatol, but optimal location (settlement) for this facility does not lies in the case study block. 01 unit of agricultural credit society has been recommended for Tulshihata complementary region but optimal location for it does not lie in the pilot study block.

Table 8.7: Identified New Locations (Settlements) for Proposed Socio-Economic Facilities

Harishchandrapur-II Block

(2021)

Sl. No.	Name of the Proposed New Settlements with Location Code (J.L. No.) for Socio-Economic Facility	Total No. of Facility	Total No. of New Location
01	**Primary School (PS)** 1. Daulatpur-092 (02); 2. Arjuna-135 (01); 3. Mashaldaha-178 (01); 4. Mohanpur-179 (02); 5. Malipakar-091 (03); 6. Maslandapur-086 (01); 7. Monaharpur-117 (01); 8. Raghabpur-136 (01); 9. Khanta-128 (01); 10. Sahapur-138 (01); 11. Datian-139 (04); 12. Suriyapura Tengurpara-151 (01); 13. Khopakati-158 (02); 14. Talbhakuria-153 (01); 15. Daulat Nagar-161 (02); 16. Fatepur-173 (01); 17. Belsur-163 (01); 18. Samukha-132 (01); 19. Tetia-134 (01); 20. Jalalpur-166 (01); 21. Talbangrua-169 (01); 22. Talgachhi-171 (01); 23. Bhairabpur-170 (01); 24. Hardam Nagar-168 (01); 25. Jagannathpur-172 (02); 26. Kariali-177 (01); and 27. Hulaspur-116 (01).	37	27
02.	**Middle School (MS)** 1. Daulatpur-092 (01); 2. Talgram-143 (01); 3. Bhaluka-175 (01); and 4. Monaharpur-117 (01).	04	04
03	**Secondary School (SS)** 1. Datian-139 (01)	01	01
04.	**Higher Secondary School (HS)**	Nil	Nil
05.	**College (Col.)**	Nil	Nil
06.	**Professional Training Institute (PTI)**	Nil	Nil
07.	**Primary Health Sub Centre (PHSC)** 1. Malipakar-091 (01); 2. Daulatpur-092 (01); 3. Datian-139 (01); 4. Uttar Kumedpur-142 (01); 5. Talbhakuria-153 (01); 6. Khopakati-158 (01); 7. Daulat Nagar-161 (01); 8. Mihaghat-162 (01); 9. Belsur-163 (01); 10. Malior-164 (01); 11. Talsur-165 (01); 12. Talgachhi-171 (01); 13. Jagannathpur-172 (01); 14. Fatepur-173 (01); 15. Kariali-177 (01); and 16. Monaharpur-117 (01)	16	16

08.	**Primary Health Centre (PHC)**	Nil	Nil
09.	**Health Centre (HC)**	Nil	Nil
10.	**Dispensary (Disp.)** 1. Daulatpur-092 (02); 2. Uttar Kumedpur-142 (01); 3. Talgram-143 (01); 4. Sadlichak-148 (01); 5. Bhaluka-175 (01); 6. Mashaldaha-178 (01); 7. Malipakar-091 (01); 8. Bejpura-087 (01); 9. Datian-139 (01); 10. Daulat Nagar-161 (01); 11. Fatepur-173 (01); 12. Talsur-165 (01); 13. Malior-164 (01); 14. Talbangrua-169 (01); 15. Talgachhi-171 (01); 16. Monaharpur-117 (01) and 17. Jagannathpur-172 (01)	18	17
11.	**Hospital (Hos.)**	Nil	Nil
12.	**Nursing Home (NH)**	Nil	Nil
13.	**Branch Post Office (BPO)** 1. Uttar Kumedpur-142 (01); 2. Talbhakuria-153 (01); and 3. Monaharpur-117 (01)	03	03
14.	**Sub Post Office (SPO)**	Nil	Nil
15.	**Post and Telegraph Office (PTO)**	Nil	Nil
16.	**Telephone (Tel.)** 1. Malipakar-091; 2. Bejpura-087; 3. Datian-139; 4. Suriyapura Tengurpara-151; 5. Dakshin Bhakuria-160; 6. Belsur-163; 7. Jalalpur-166; 8. Samukha-132; and 9. Jagannathpur-172	*	09
17.	**Fare Bus Stop (FBS)** 1. Uttar Kumedpur-142 (01); 2. Talgram-143 (01); 3. Bejpura-087 (01); 4. Monaharpur-117 (01); 5. Datian-139 (01); 6. Khopakati-158 (01); 7. Daulat Nagar-161 (01); 8. Talsur-165 (01); 9. Malior-164 (01); 10. Talbangrua-169 (01); 11. Talgachhi-171 (01); and 12. Jagannathpur-172 (01).	12	12
18.	**Bus Station (BS)**	Nil	Nil
19.	**Railway Station (RWS)**	Nil	Nil
20.	**Pucca Road (PR)** 1. Dakshin Gouripur-167; 2. Basant Dhanipur-137; 3. Talgram-143; 4. Betahal-145; 5. Sadlichak-148; 6. Datian-139; 7. Suriyapura Tengurpara-151; 8. Dakshin Bhakuria-160; 9. Par Bhaluka; 10. Belsur-163; 11. Talsur-165; 12. Jalalpur-166; 13. Samukha-132; 14. Talbangrua-169; 15. Hardam Nagar-168; 16. Talgachhi-171; 17. Bhairabpur-170; and 18. Monaharpur-117	*	18
21.	**Daily Market (DM)** 1. Daulatpur-092 (01)	01	01
22.	**Periodic Market (PM)** 1. Datian-139 (01)	01	01
23.	**Regulated Market (RM)**	Nil	Nil
24.	**Electricity for Domestic Purpose (EDP)** 1. Daulatpur-092; 2. Dakshin Gouripur-167; 3. Basant Dhanipur-137; 4. Par Bhaluka-174; 5. Latasi-089; 6. Chithalia-096; 7. Bejpura-087; 8. Bansdol-094; 9. Maslandapur-086; 10. Sahapur-138; 11. Khopakati-158; 12. Talbhakuria-153; 13. Degree Inlis-157; 14. Daulat Nagar-161; 15. Dakshin Bhakuria-160; 16. Fatepur-173; 17. Mihaghat-162; 18. Uttar Bhakuria-159; 19. Samukha-132; 20. Tetia-134; 21. Jalalpur-	*	27

	166; 22. Talbangrua-169; 23. Bhairabpur-170; 24. Hardam Nagar-168; 25. Degun-176; 26. Jayrampur-010; and 27. Chhatrak-155		
25.	**Tap Water (TW)** 1. Daulatpur-092; 2. Uttar Kumedpur-142; 3. Talgram-143; 4. Mashaldaha-178; 5. Datian-139; 6. Daulat Nagar-161; 7. Monaharpur-117; and 8. Malior-164	*	08
26.	**Electricity for Agriculture (EA)** 1. Chithalia-096; 2. Bejpura-087; 3. Datian-139; 4. Suriyapura Tengurpara-151; 5. Khopakati-158; 6. Daulat Nagar-161; 7. Dakshin Bhakuria-160; 8. Fatepur-173; 9. Belsur-163; 10. Talsur-165; 11. Malior-164; 12. Jalalpur-166; 13. Samukha-132; 14. Talbangrua-169; and 15. Hardam Nagar-168	*	15
27.	**Agricultural Seed Distribution Centre (ASDC)**	Nil	Nil
28.	**Fertilizer Distribution Centre (FDC)** 1. Betahal-145 (01); 2. Fatepur-173 (02); 3. Mohanpur-179 (02); 4. Latasi-089 (01); 5. Malipakar-091 (02); 6. Bejpura-087 (01); 7. Monaharpur-117 (01); 8. Khanta-128 (02); 9. Datian-139 (03); 10. Talbhakuria-153 (02); 11. Suriyapura Tengurpara-151 (01); 12. Khopakati-158 (01); 13. Dakshin Bhakuria-160 (01); 14. Mihaghat-162 (02); 15. Talsur-165 (03); 16. Malior-164 (02); 17. Jalalpur-166 (01); 18. Talbangrua-169 (01); 19. Hardam Nagar-168 (01); 20. Bhairabpur-170 (01); and 21. Jagannathpur- 172 (02)	33	21
29.	**Cooperative Cold Store (CCS)**	Nil	Nil
30.	**Soil Testing Centre (STC)**	Nil	Nil
31.	**Agricultural Farm and Research Centre (AFRC)**	Nil	Nil
32.	**Agricultural Credit Society (ACS)** 1. Datian-139 (01); and 2. Malior-164 (01)	02	02
33.	**Commercial Bank (CB)**	Nil	Nil
34.	**Cooperative Commercial Bank (CCB)**	Nil	Nil
35.	**State Animal Health Centre (SAHC)**	Nil	Nil
36	**Block Animal Health Centre (BAHC)**	Nil	Nil
37.	**Additional Block Animal Health Centre (ABHC)**	Nil	Nil
38.	**Block Head Quarter (BHQ)**	Nil	Nil
39.	**Police Station (Pst.)**	Nil	Nil
40.	**Sub Division Office (SDO)**	Nil	Nil
41.	**District Head Quarter (DHQ)**	Nil	Nil
42.	**Park (Prk.)**	Nil	Nil
43.	**Public Library (PL)** 1. Uttar Kumedpur-142 (01)	01	01
44.	**Free Reading Room (FRR)** 1. Uttar Kumedpur-142 (01)	01	01
45.	**Cinema Talkies (Cin.)**	Nil	Nil

Source: Compiled by author.

Note: Figure under bracket refers to the number of facility to be located in the settlement.

*Facilities are not counted in number rather settlements having such facility are counted.

It is exhibited from the Table 8.7 that as highest as 27 new settlements have been identified for each of the facility of primary school and electricity for domestic purpose in the block. Datian (J.L. No. 139) of the complementary region of Khanta is a settlement with estimated population of 10,640 persons (year 2021) has been identified as the best location of as many as 12 new facilities (Table 8.7). If all the facilities are provided, Datian will become a central place with higher functional gravity to provide variety of services and functions to the population of its own and to the population of its surrounding settlements till 2021. Monaharpur settlement (J.L. No. 117) with its projected population 8560 persons in 2021 has also been identified for the location of facilities of primary school, middle school, primary health sub centre, dispensary, branch post office, fare bus stop, pucca road, tap water and fertilizer distribution centre. If all these facilities are provided till the plan period, the people of Monaharpur its people will not move to the nearest central place of Tulshihata that lies outside the case study block.

Proposed model for micro-level planning to attain balanced regional development is a pragmatic one. It has an edge over the preceding models which have been used and discussed some of their principles in evaluating, assessing and analysing the socio-economic facilities their distribution, spacing and centrality scores etc.. These quantitative models have failed to realise the ground reality. Quantitatively it is also good and rational one. But, spatial behaviour is mediated out of the cognition of man and environment in which human being dictates their activities to fulfill their needs. The value system or the normative thing comes in the way of adoptive behaviour of the men for carrying out their socio-economic activities. These normative things play an important role in decision making process. All these attributes are essential to understand and to consider while formulating any model for planning. The preceding model are lacking with the attributes because of non quantifiable. It has been developed out of the pilot survey taking into consideration of normative value of the society with the quantitative one. The application of this proposed model is more logical and rational because it has realised the ground reality. The application of this model is not only limited in every field of geographical analysis to arrive at fruitful conclusion but to all the disciplines which exercise their work in spatial science. It will be more useful in the arena of globalization, where

every entrepreneur is switching over their business towards out sourcing one, which highly demands to understand the spatial behaviour of the economics of the region for attaining maximum out put.

Its application at government, quasi government and NGO level to reduce the levels of regional disparities for balanced regional development at micro-level is proved to be so instrumental and will fulfill the essence philosophy of micro-regional planning which envisages the people participation and consideration of local resources in formulating the plan. If this model is applied without being biased by government agencies for the sake of regional development with full sense of national sprit, it is hoped that the existing disparities will be reduced to greater extent and balanced regional development would be achieved.

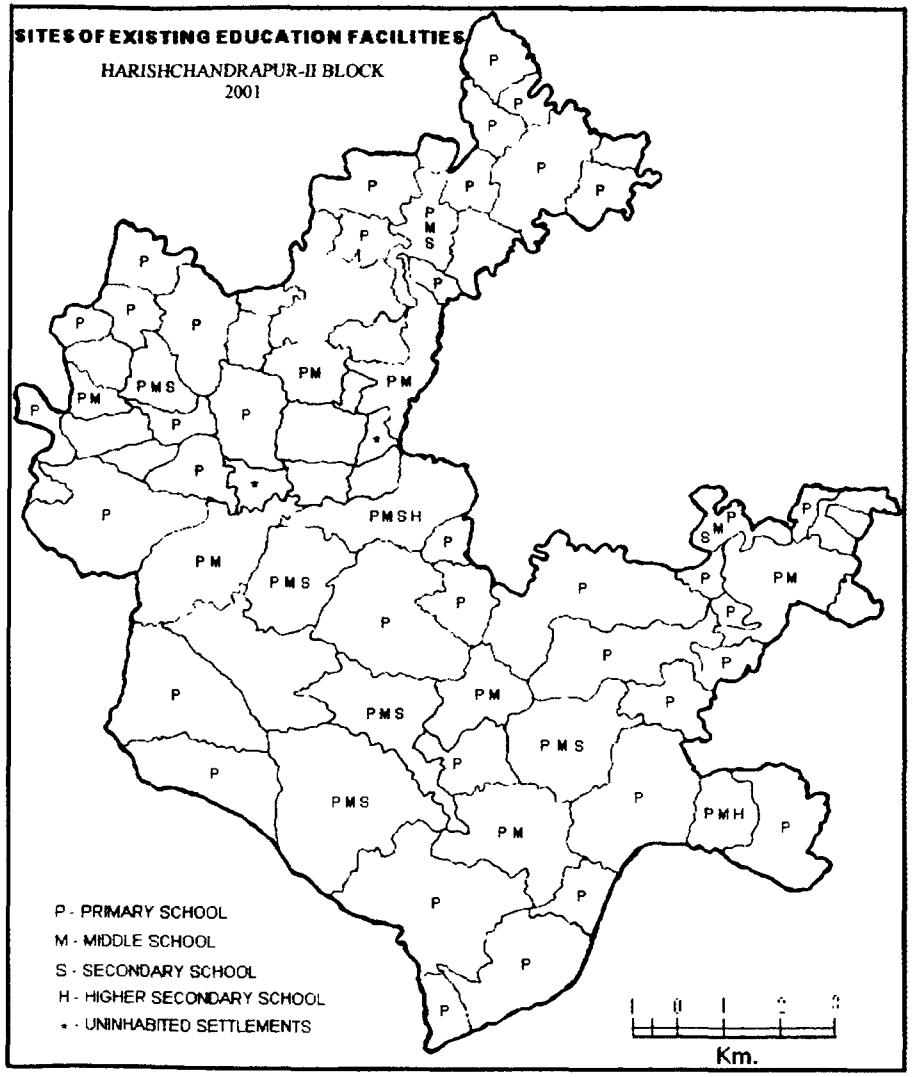

Fig. 8.9

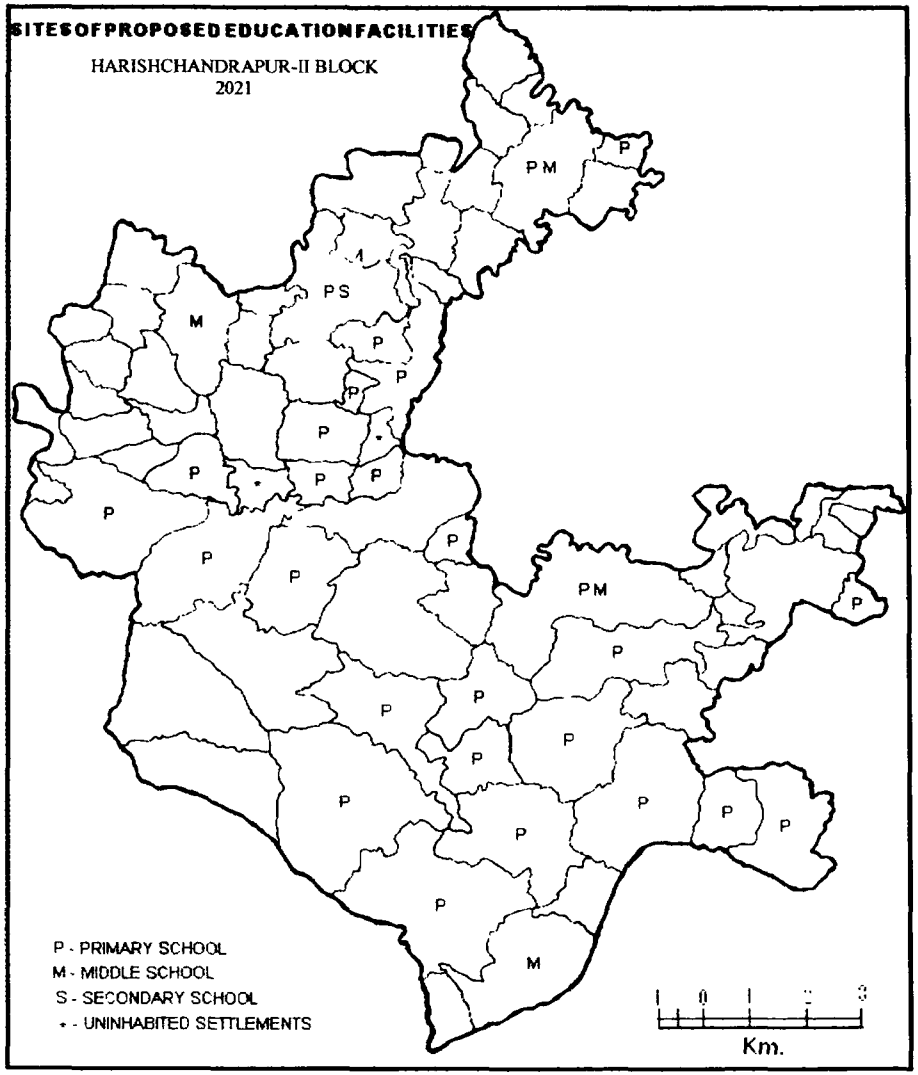

Fig. 8.10

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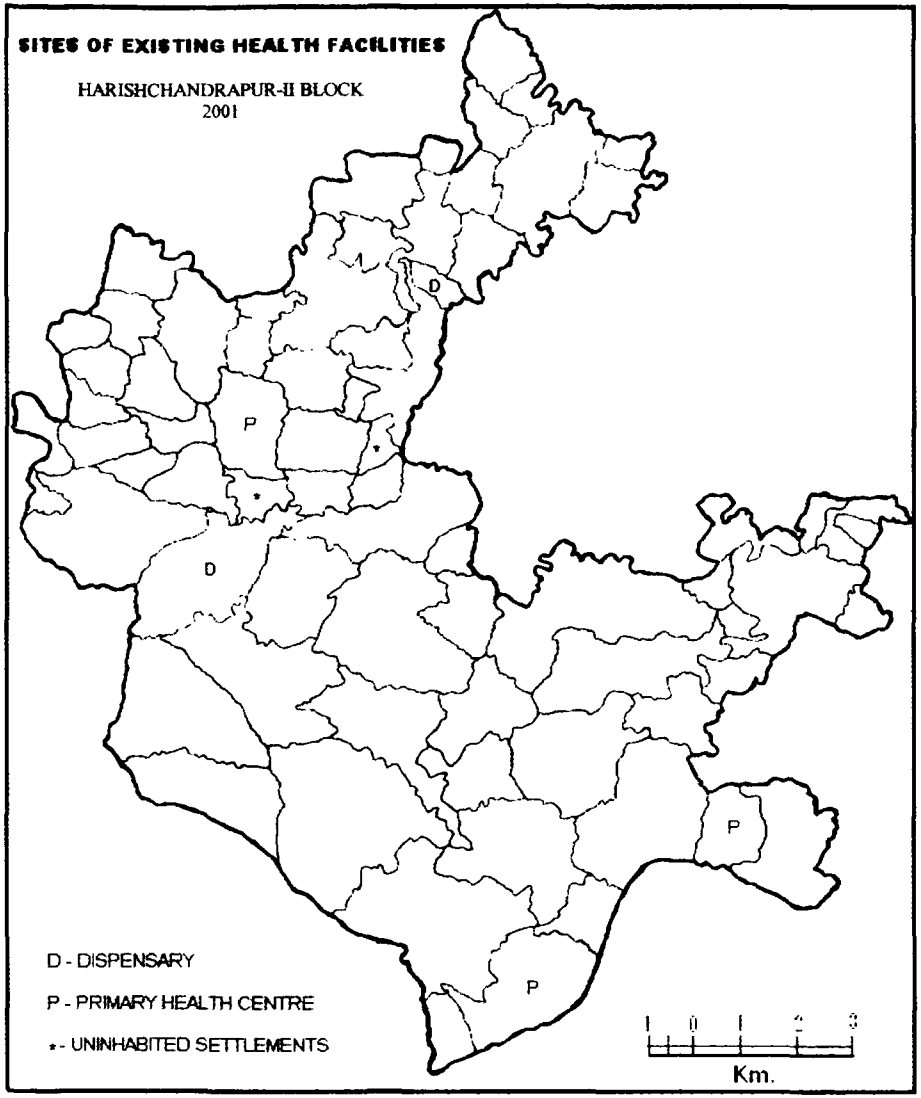

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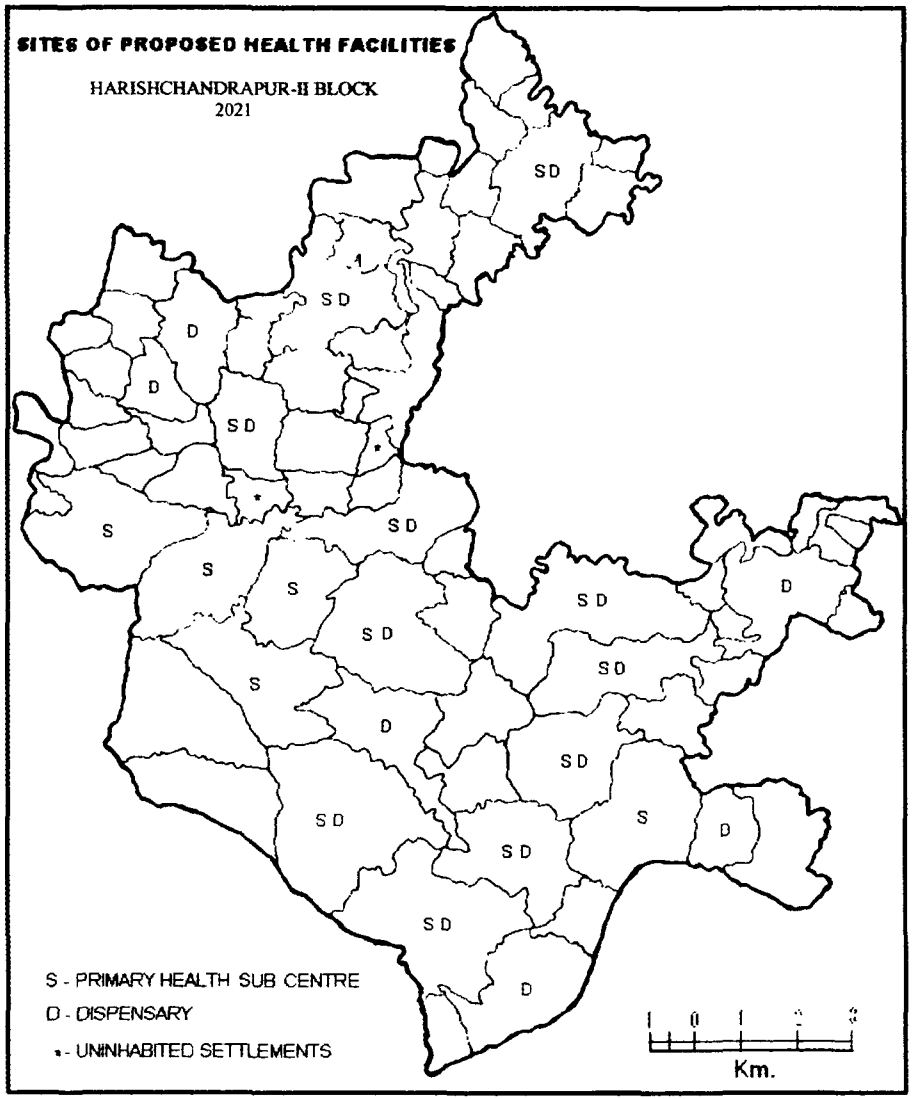

Fig. 8.12

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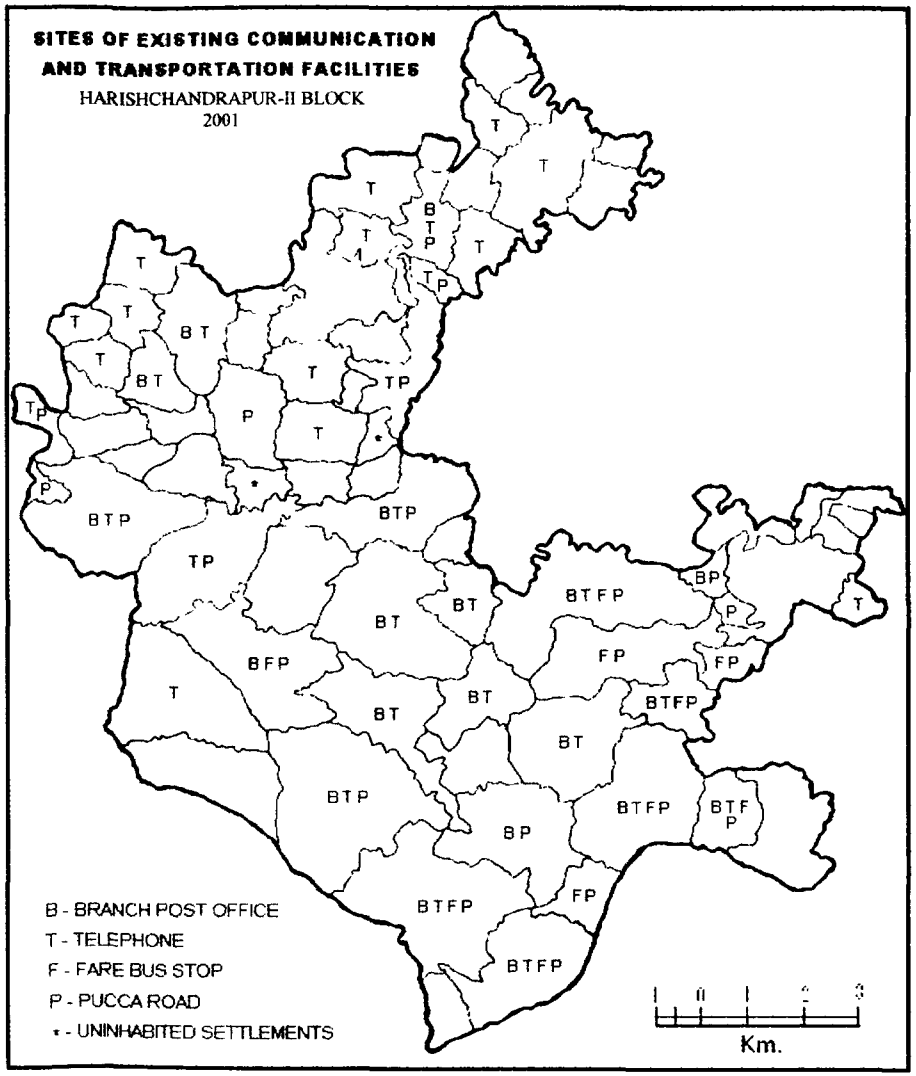

Fig. 8.13

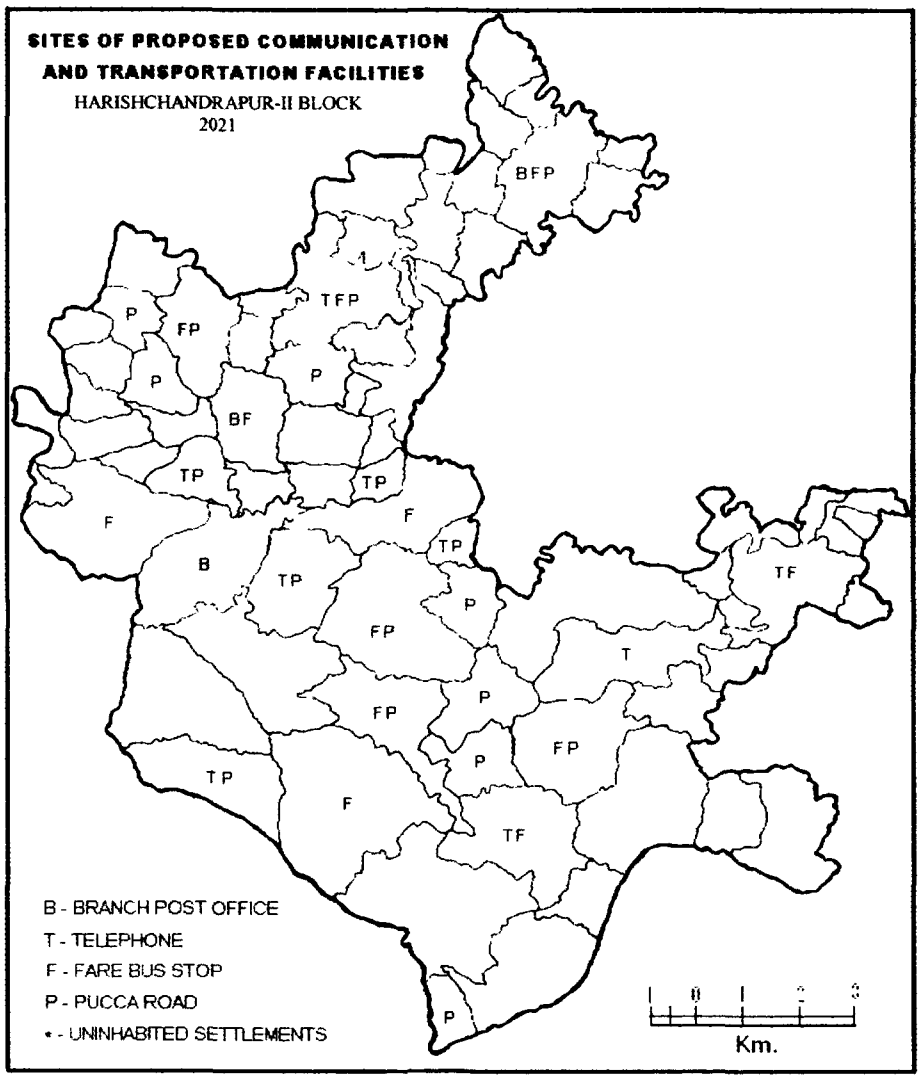

Fig. 8.14

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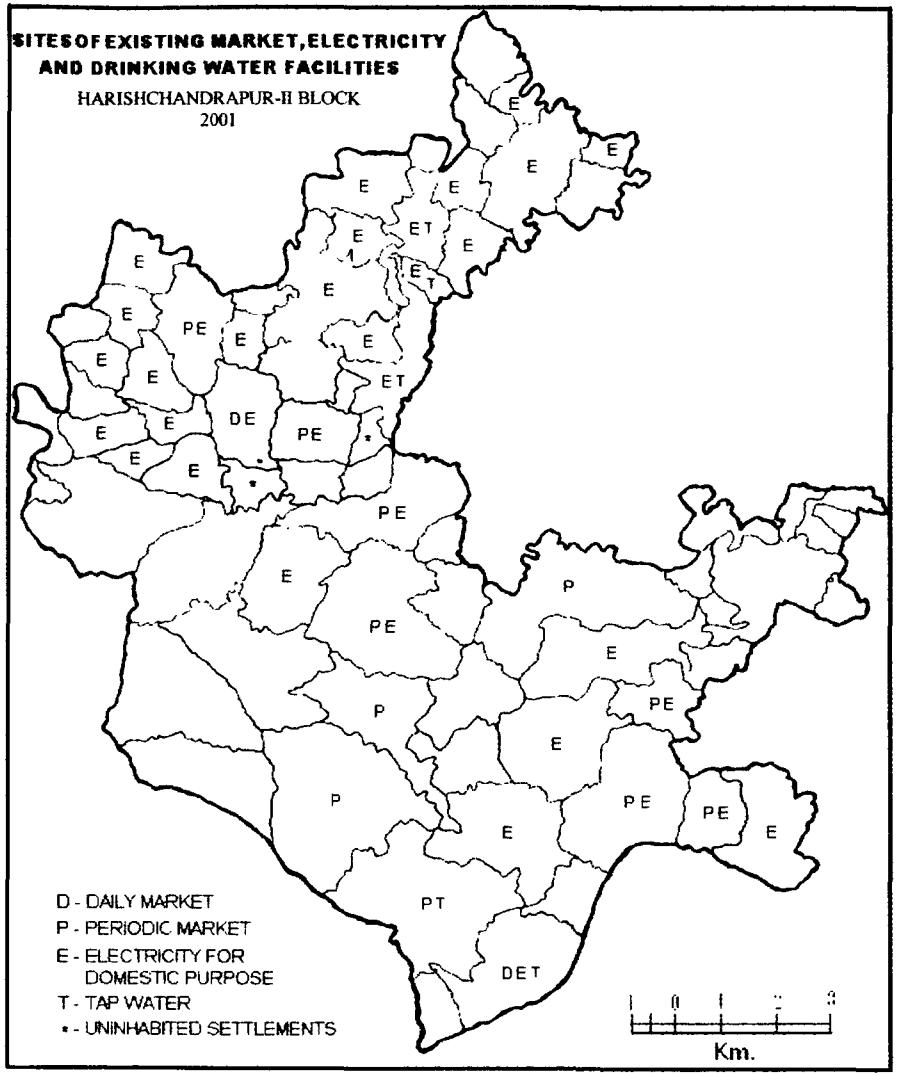

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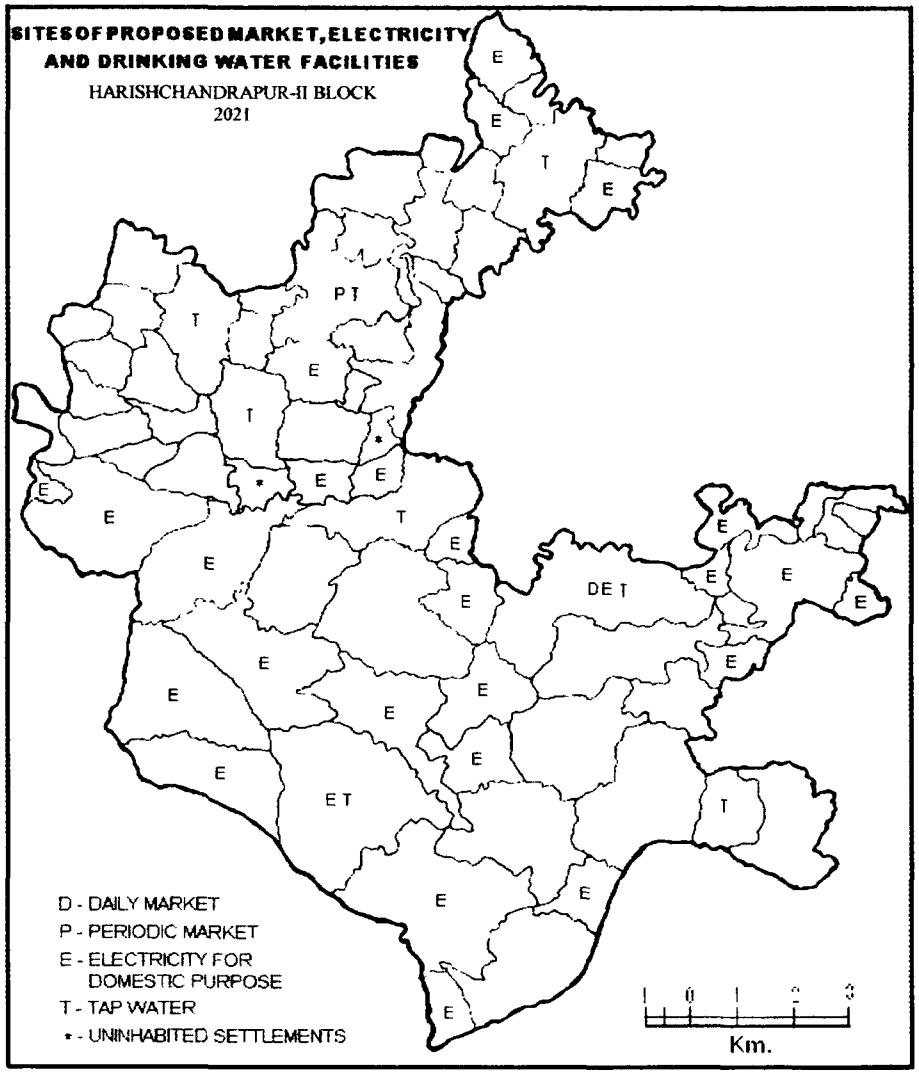

Fig. 8.16

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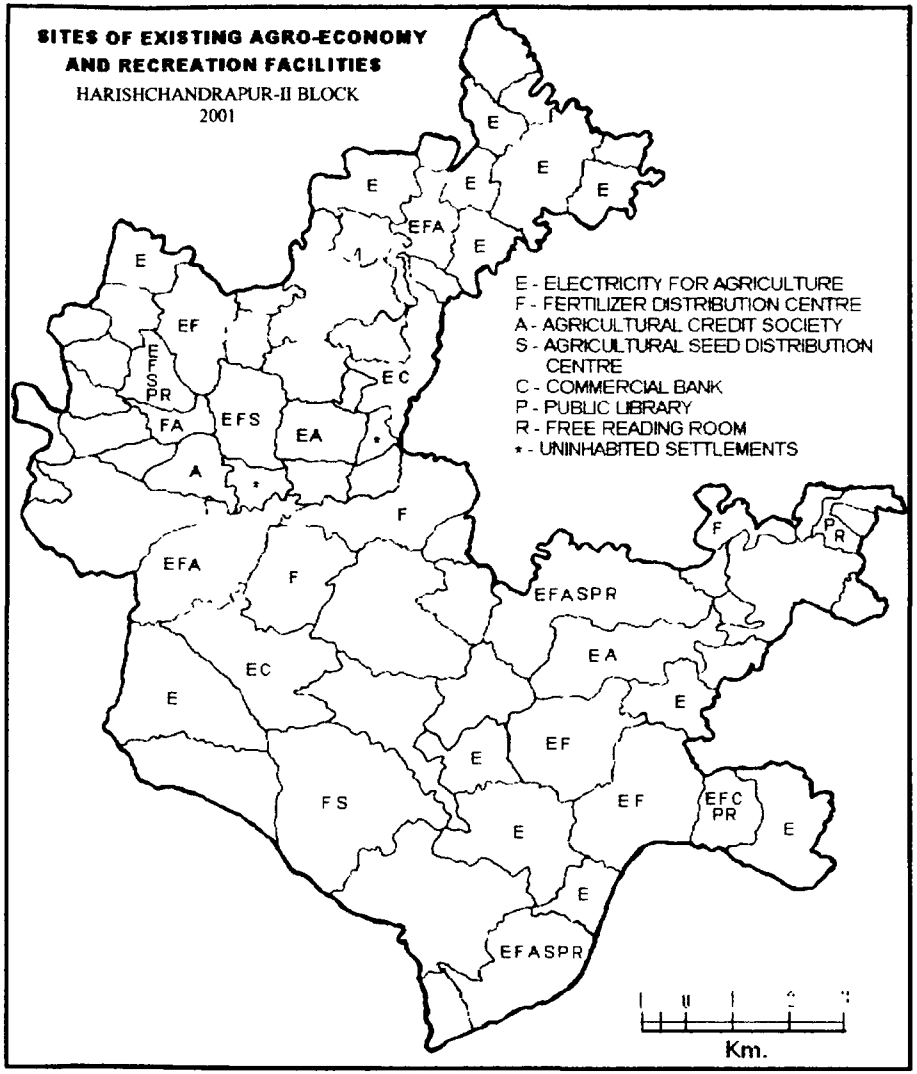

Fig. 8.17

Fig. 8.18

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SUMMARY AND CONCLUSION

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Since inception, Indian planning has been centralized being formulated at the centre for the entire country. It is also known as sectoral planning because such planning is formulated for different socio-economic sectors like, education, health, power, transportation and communication, etc. Such sectoral planning approach could not achieve success in reducing the poverty, unemployment and inter and intra regional and human group disparities in the country. Sectoral plan ignores the evaluation of resource base, local needs of backward regions and backward sections of the society, rather it promotes only those regions where infrastructure was available for development. However, the regions lacking such infrastructure did not attract growth impulses and consequently remained socio-economically lagged behind. Such situation led to the emergence of regional disparities in socio-economic development, which become more intensive with time. The idea of decentralization of Indian planning process has come up in recent time and got decentralized to state level planning. During Fourth Five Year plan (1969-74), emphasis was given on district level planning. Further it decentralized into block level plan during the Sixth Five Year Plan (1980-85). Such decentralized planning process was an attempt to collect village requirements. But no serious attempts were made at regional level. In such situation, adoption of micro-level planning approach is imperative to overcome the existing problems and to achieve the goal of balanced regional socio-economic development in the country. The need of grass root level planning arises to take care of what sectoral plans failed to accomplish.

Malda district- study area is socio-economically one of the lagged behind districts in the state of West Bengal. It is inflicted with dire socio-economic and cultural disparities at district and block level as well. However, the government has provided facilities for the development of agriculture, education, medical, transport and communication which are neither located at ideal settlement nor sufficient to keep pace with the alarming growth of population. Subsequently mass illiteracy, poverty, unemployment are common features of the region. The district lies within the latitudinal and longitudinal extension of $24^{o}40'\ 20''$ to $25^{o}32'08''$ North and $87^{o}45'50''$ to $88^{o}28'10''$ East respectively. According to the census of India 2001, it

accounts for a total population of 3,290,468 persons distributed among 1646 settlements including five urban centres.

Both qualitative and quantitative methods have been used for the analysis of primary and secondary data in the present study. 'Nearest-Neighbour Analysis', Mather's model of mean spacing and Gini's coefficient of concentration techniques have been adopted to analyse the spatial organisation of settlements and socio-economic facilities. Z-score and composite mean Z-score techniques have been used to examine the regional imbalances in the levels of socio-economic development. To carry out the different steps of planning process, basic concepts of central place model devised by Christaller (1933) have been followed. Median Population Threshold (MPT) has been estimated on the basis of 'Reed-Muench' method and central places have been hierarchically arranged based on centrality score of central places. Complementary region of central places has been delineated on the basis of primary information relating to consumers travelling behaviour to a respective central place to obtain goods and services. Spatio-functional gap of each facility have been estimated as the ratio of function between complementary region and district as a whole. Karl Pearson's technique of coefficient of correlation, student's 't' test and linear regression technique has been adopted to examine the causal relationship between dependent and independent variables as well as to test the hypotheses.

The goal of micro-level planning is achieved by providing adequate facilities to the settlements at economically accessible, socially desirable and environmentally sustainable. Therefore, analysis of spatial organisation of settlements is important for the formulation of planning. The analysis of spatial organisation of settlement exhibits an uneven distribution of settlements in the district. Bamangola block has recorded highest density of settlements i.e., 6.8 settlements per 10 sq. km. but lowest average size of settlements i.e., 1.46 sq. km. per settlement. However, Manikchak block has recorded lowest density of settlements i.e., 2.3 settlements per 10 sq. km. but highest average size of settlements i.e., 4.39 sq. km per settlement. Therefore, an inverse relationship between density and average size of settlements has been observed in the study area. A wide variation in the distribution of population among different size group of settlement exists in the district. While, large number of small size settlements accommodates lesser population, few number of

bigger size settlements accommodates larger population. For example, 11.48 percent of settlements having population less than 250 persons in each accommodate only 0.87 percent of population of the district, while 2.19 percent of settlements having population more than 10,000 persons accommodate more than 20 percent of population. Highest i.e., 30.11 percent population are accommodated in the settlements of population size group 2000 to 4999 persons. The Gini's coefficient of concentration ratio of 0.580 reveals that population is somewhat disproportionately concentrated at few bigger size settlements in the study area. Settlements in the district are located at 1.58 km. apart from each other, while highest (2.25 km) and lowest (1.30 km) spacing among settlements have been recorded in Manikchak and Bamangola blocks respectively. Correlation (r) value 0.5379 at 13 degree of freedom significant at 5 percent level infers the fact that spacing is the function of settlement or bigger size settlements are located at higher distance from each other.

Existing 45 socio-economic facilities have been taken into consideration for the study and have been classified into 12 main categories. Among them, each primary school serves 1730 persons. Gini's coefficient ratio of 0.096 reveals that the settlements having electricity for domestic purpose are quite uniformly distributed among each size group of settlements in the district. However, Gini's ratio of 0.978 of the distribution of soil testing centre, sub-division office and district headquarter indicate their disproportional concentration at single point or it reveals quite clustered distribution. The analysis through the cumulative frequency curve exhibits that, higher gap between the frequency curves (curves of settlements having facility and all inhabited settlements) is observed among the small size group of settlements. However, the gap subject to decreases with the increasing size of settlements. It reveals that, due to the unplanned allocation, smaller size settlements are lacking of facility more than the bigger size settlements.

The analysis of levels of socio-economic development reveals wide regional disparities within the district as well as block boundary. Harishchandrapur-II is single block lies under the low level of development in each socio-economic sector i.e., education, health, communication and transportation, market, electricity and drinking water, agro-economy, finance and veterinary, and recreation. After estimating the composite mean Z-score of all socio-economic facilities, Harishchandrapur-II block

has been identified as socio-economically least developed one followed by Kaliachak-III. English Bazar block stood at first rank in socio-economic development followed by Chanchal-I, Bamangola, Harishchandrapur-I and so on. Wide regional disparities in socio-economic development have been recorded even within the administrative boundary of least developed block. In Harishchandrapur-II block, Sultan Nagar gram panchayat has attained lowest index of socio-economic development followed by Malior-2, while Bhaluka relatively stood at first position. In view of the ranking of blocks, first preference should be given to Harishchandrapur-II block for the formulation and implementation of planning model, however allocation of facilities should be started with Sultan Nagar gram panchayat.

To overcome the above problems i.e., unplanned allocation of facilities in an unorganized manner among the size group of settlements and regional disparities in the levels of socio-economic development, and to achieve balanced regional development keeping pace with growth of population, Christaller's Central Place concept (1933) has been adopted as a tool of planning. His concept is based on certain assumptions relating to isotropic land surface. Since it is difficult to find such an area, basic philosophical ideas of his theory have been adopted instead of complete model to carry out the different steps of planning for balanced regional development in the district.

The Median Population Threshold (MPT) of each facility has been estimated on the basis of 'Reed-Muench' method which is complex but authentic, logical and mathematically sound. This method seeks to find out the location of entry point or population threshold below the limit of which all settlements lacking the function while above of the limit all settlements possess the function being considered. MPT of each facility is not same, rather varies depending on their importance. Higher order functions have higher value of MPT and vice-versa. The computed MPT ranges from 361 persons of electricity for domestic purpose facility being lowest to 161,500 persons of each soil testing centre and district headquarter facility being highest. MPT of facility simply implies that any settlement with MPT is supposed to sustain the location of it. Corresponding to the Median Population Threshold, each facility has been assigned certain functional weightage. The causal analysis reveals that the distribution of population and socio-economic facilities among the size group of

settlements in the district are positively correlated (r = 0.958) and significant at 1 percent level at 5 degree of freedom. Their positive correlation accepts the hypothesis, availability of socio-economic facilities is the function of population distribution among the size group of settlements. It may be ascertained that large number of people are concentrated at bigger size settlements mainly due to the higher availability of facilities there, and it is contrary to the smaller size settlements.

On the basis of criteria for the identification of central places, 361 central places have been identified and they have been arranged into six hierarchical orders on the basis of their functional importance or centrality score. The analysis reveals that 274 central places with centrality score less than 236.09 are considered under first order i.e., lowest order of hierarchy, while 71 settlements are included in second order, 11 settlements in third order, 03 settlements in fourth order, 01 settlement in fifth order and rest 01 settlement in sixth order i.e., highest order of hierarchy. It has been observed that the centrality score of central place is positively correlated to their total population (r = 0.867). It accepts the hypothesis that, the centrality score of central places is directly correlated to its population and infers the fact that people are tend to concentrated at the central place where higher important facilities are exist.

Each central place provides goods and services to its population and the population of its surrounding settlements while dependent population offers demand for goods and services. Consequently, an interaction is emerged between the central place and its dependent settlements. To analyse such an interaction, Harishchandrapur-II block has been taken for pilot study. In the block, 15 first order and 06 second order central places have been identified. The area over which such an interaction is emerged is known as the complementary region or zone of influence of the central place. The complementary region of each central place has been delineated on the basis of both quantitative method as well as empirical observation. In the quantitative approach, the complementary regions have been delineated based on the mathematical equation devised by V.L.S. Prakash Rao (modified method). Due to some drawbacks associated with the circular form of complementary regions according to mathematical equation complementary region of identified both first order and second order central places have been delineated on the basis of empirical observation. Using both methods, it has been observed that the settlements of Sultan

Nagar gram panchayat i.e., Hulaspur, Chhatrak, Monaharpur, Jayrampur and Bildaha do not come under the zone of influence of any central place in Harishchandrapur-II block. The people of these settlements moves to the central place that lies outside the study block to obtain goods and services. People of Hulaspur, Chhatrak and Monaharpur travels to Tulshihata (third order central place) and people of Jayrampur and Bildaha travels to Bhatol (first order central place) of Harishchandrapur-I block.

The analysis of spatial interaction and organisation reveals that, among the first order central places, Daulat Nagar serves highest population i.e., 15671 persons and covers highest area i.e., 19.61 sq. km. in 2001 and it is also estimated to serve highest population i.e., 20371 persons in 2021. However, lowest population and area i.e., 4422 persons and 4.11 sq. km. respectively are served by Gaushpur central place in 2001, while it is estimated to serve lowest population i.e., 6344 persons in 2021. Among the second order central places, Uttar Kumedpur serves largest population i.e., 52491 persons in 2001 and estimated to serve largest population i.e., 68491 persons in 2021. It has been observed from the empirical study that the second order central places by providing first order (lowest order) functions with lower market range makes first order complementary region and then subsequently second order complementary region. Therefore, lower order complementary regions come under the nesting pattern of higher order complementary region. The causal analysis reveals that, the centrality score of central places is positively correlated to their dependent population (r= 0.741) and dependent area (r= 0.742). It may be ascertained that, the central places of higher functional importance attract a large number of population from longer distance and it is contrary to the central places of lower functional importance.

The estimation of dependent population and dependent area is important to examine the spatio-functional gap (ratio of function between complementary region and district average) that reveals the adequacy or inadequacy of existing functions within the complementary region of central place. At the first order hierarchy, there are 21 complementary regions (excluding complementary regions of Bhatol and Tulshihata central places that lie outside the case study area) in Harishchandrapur-II block. These complementary regions provide existing 14 first order functions of which dispensary and tap water facilities are very rarely available to the people of the

block. Dispensary is available only in two complementary regions i.e., Sultan Nagar and Talbhakuria while tap water is available in three complementary regions i.e., Bhaluka, Sultan Nagar and Khanta.

The analysis of spatio-functional gap of first order functions in 2001 reveals that, in the block only four complementary regions are adequately served by primary school while rest 19 complementary regions are inadequately served. 12 and 09 complementary regions are served adequately and inadequately by middle school facility respectively. 08 complementary regions show better standard (functional ratio more than 1) of secondary school facility while among rest 13 complementary regions Daulat Nagar is inadequately served and 12 regions are not located with this facility. Regarding branch post office facility, 14 complementary regions show better standard, 04 below standard (functional ratio less than 1) and rest 03 are not having this facility. In the block, not a single settlement have telephone facility within the complementary region of Malipakar and Jagannathpur central places, while 12 and 07 complementary regions show better standard and below standard of this facility respectively. 05 complementary regions show better standard of pucca road facility while 11 regions are inadequately served and rest 5 regions are not having this facility. Only 03 complementary regions are adequately served by electricity for domestic purpose, while 08 complementary regions are adequately served by electricity for agriculture. Regarding the facility of fertilizer distribution centre, only 05 complementary regions show better standard, 09 regions have recorded below standard and rest 07 are not having this facility.

The spatio functional gaps of second order functions in 2001 reveals that among 06 existing second order complementary regions, 03 regions are adequately served while rest regions are inadequately served by higher secondary school and primary health centre facilities. 04 and only 01 service areas are adequately served by agricultural seed distribution centre and commercial bank facility respectively. However, not a single complementary region shows better standard of daily market facility. Only 03 service areas show better standard of each public library and free reading room facility while rest service areas have recorded below standard.

The spatio-functional gaps of both first order and second order functions have been examined to be recorded till 2021 on the basis of projected population of each

settlement in the pilot study area. The analysis reveals that, due to estimated growth of population the functional gap of each function is estimated to be increasing that suggests requirement of new more facilities in addition to existing number. The analysis also reveals that, due to less increase of estimated population in the complementary region than the average increase in the district till 2021, the functional gap is estimated to be reduced in 2021 than that in 2001. Such a condition is estimated to have happened in the complementary region of five central places i.e., Sadlichak, Mashaldaha, Malipakar, Talbangrua and Talgachhi in the block.

To achieve a balanced regional socio-economic development, a diagnostic planning model has been proposed, which comprises two folds planning action i.e., first, estimation of required facilities to fill the functional gap, second, identification of optimal new location for proposed facilities.

The analysis reveals that, to keep pace with growth of population and to achieve balanced regional development, as many as 37 primary schools, 04 middle schools, 01 secondary schools, 19 dispensaries, 03 branch post offices, 12 fare bus stops, 35 fertilizer distribution centres, 03 agricultural credit societies and 01 periodic market have been proposed in addition to existing units in Harishchandrapur-II block till the plan period 2021. The analysis also reveals that, 10 more inhabited settlements have been recommended for telephone facility, 19 settlements for pucca road facility, 29 settlements for electricity for domestic purpose, 15 settlements for electricity for agriculture and 08 settlements for tap water facility in addition to existing facilities.

On the basis of assessment of MPT of facility, nearest neighbour distance, accessibility and connectivity of settlement the optimal new location for proposed facilities have been identified so that maximum people can avail facilities within minimum distance. It is exhibited after determining the optimal location of proposed facilities that Datian settlement (J.L. No. 139) of Sultan Nagar gram panchayat has been identified as the best location of as many as 12 new more facilities. Monaharpur settlement (J.L. No. 117) has been identified as the best location of 09 new more functions i.e., primary school, middle school, primary health sub-centre, dispensary, branch post office, fare bus stop, pucca road, tap water and fertilizer distribution centre. Both the settlements will become central places with high functional importance if all the proposed facilities are provided till the plan period. Therefore,

people of these settlements and its surrounding settlements would not depend on the central place that lies outside the case study block. Subsequently, the problem of regional imbalances and inequalities will be solved by the year 2021.

The proposed plan has been formulated as a pragmatic model to eliminate the existing problems and problems likely to exist till 2021. If this model is adopted by the regional planners and policy makers, the areas would be developed in balanced form.

Regional planners, policy makers and government are suggested to adopt such a bottom-up approach planning for entire district in the same way and the same process to eliminate regional disparities that macro level planning approach could not achieve.

APPENDICES

Appendix I

Block wise Distribution of Settlement and Population
Malda District
(2001)

Population size group of settlements (Persons)	Harishchandrapur-I		Harishchandrapur-II		Chanchal-I		Chanchal-II		Ratua-I	
	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.
Below 250	06 (5.7)	678 (0.4)	02 (2.8)	333 (0.2)	08 (8.1)	1,114 (0.6)	06 (6.8)	412 (0.2)	05 (5.5)	543 (0.3)
250 – 499	13 (12.5)	4,865 (3.9)	05 (6.9)	1,784 (01.0)	06 (6.1)	2,326 (1.4)	06 (6.8)	2,303 (1.4)	06 (6.6)	2,460 (1.1)
500 – 999	27 (26.0)	18,961 (11.6)	13 (18.1)	9,394 (4.7)	21 (21.2)	14,864 (8.5)	16 (18.2)	11,947 (7.2)	18 (19.8)	13,433 (6.2)
1000- 1999	32 (30.7)	46,978 (29.0)	18 (25)	24,847 (12.5)	28 (28.3)	38,573 (22.2)	29 (33.0)	40,248 (24.4)	23 (25.3)	35,591 (16.4)
2000 – 4999	24 (23.1)	72,750 (44.8)	20 (27.8)	65,596 (33.1)	32 (32.3)	88,203 (50.6)	27 (30.7)	82,419 (49.9)	32 (35.1)	107,816 (49.6)
5000 – 9999	01 (1.0)	5,212 (3.2)	14 (19.4)	96,085 (48.5)	03 (3.0)	19,073 (10.9)	04 (4.5)	27,863 (16.9)	05 (5.5)	32,906 (15.1)
10,000 & Above	01 (1.0)	12,962 (8.0)	0	0	01 (1.0)	10,057 (5.8)	0	0	02 (2.2)	24,607 (11.3)

(Contd...)

(Contd.... Appendix I)

Population size group of settlements (Persons)	Ratua-II		Gazole		Bamangola		Habibpur		Old Malda	
	No.	Population	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.
Below 250	0	0	47 (16.3)	8,137 (2.7)	17 (12.1)	2,991 (2.3)	51 (21.9)	8,146 (4.3)	15 (13.0)	2,787 (1.4)
250 – 499	02 (4.2)	967 (0.6)	66 (23.0)	24,476 (8.3)	38 (26.9)	13,974 (11.0)	74 (31.8)	26,798 (14.3)	39 (33.9)	15,254 (7.9)
500 – 999	07 (14.6)	5,711 (3.5)	85 (29.5)	60,310 (20.5)	41 (29.1)	29,109 (22.9)	62 (26.6)	43,301 (23.1)	25 (21.7)	18,894 (9.7)
1000- 1999	08 (16.7)	11,066 (6.9)	58 (20.1)	82,188 (27.9)	33 (23.4)	47,038 (37.0)	25 (10.7)	33,609 (17.9)	17 (14.8)	20,673 (10.6)
2000 – 4999	21 (43.7)	72,391 (45.0)	27 (9.4)	90,062 (30.6)	12 (8.5)	34,040 (26.8)	15 (6.4)	40,942 (21.8)	14 (12.2)	45,581 (23.5)
5000 – 9999	09 (18.7)	52,584 (32.7)	05 (1.7)	29,542 (10.0)	0	0	06 (2.6)	34,854 (18.6)	04 (3.5)	28,066 (14.5)
10,000 & Above	01 (2.1)	18,185 (11.3)	0	0	0	0	0	0	01 (0.9)	62,959 (32.4)
Total	48 (100)	160,904 (100)	288 (100)	294,715 (100)	141 (100)	127,152 (100)	233 (100)	187,650 (100)	115 (100)	194,214 (100)

(Contd...)

(Contd.... Appendix I)

Population size group of settlements (Persons)	English Bazar		Manikchak		Kaliachak-I		Kaliachak-II		Kaliachak-III	
	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.
Below 250	19 (16.8)	2,423 (0.6)	04 (5.6)	292 (0.1)	01 (1.6)	188 (0.1)	05 (9.1)	310 (0.1)	03 (4.5)	320 (0.1)
250 – 499	12 (10.6)	4,557 (1.2)	06 (8.3)	2,477 (1.2)	02 (3.3)	748 (0.2)	02 (3.6)	566 (0.3)	03 (4.5)	847 (0.3)
500 – 999	22 (19.5)	16,327 (4.2)	05 (6.9)	3,604 (1.7)	03 (4.9)	1,863 (0.6)	06 (10.9)	3,876 (1.8)	09 (13.6)	7,178 (2.5)
1000- 1999	25 (22.1)	32,943 (8.5)	20 (27.8)	26,183 (12.2)	11 (18.0)	14,702 (4.7)	10 (18.2)	13,749 (6.5)	17 (25.8)	22,737 (8.0)
2000 – 4999	21 (18.6)	64,149 (16.6)	22 (30.6)	69,439 (32.4)	18 (29.5)	62,460 (20.1)	16 (29.1)	50,491 (23.9)	15 (22.7)	44,236 (15.6)
5000 – 9999	11 (9.7)	85,312 (22.0)	11 (15.2)	66,696 (31.1)	19 (31.2)	148,060 (47.6)	11 (20.0)	71,239 (33.7)	08 (12.2)	57,625 (20.3)
10,000 & Above	03 (2.7)	181,981 (46.9)	04 (5.6)	45,436 (21.2)	07 (11.5)	82,914 (26.7)	05 (9.1)	71,175 (33.7)	11 (16.7)	151,433 (53.2)
Total	113 (100)	387,692 (100)	72 (100)	214,127 (100)	61 (100)	310,935 (100)	55 (100)	211,406 (100)	66 (100)	284,376 (100)

Source: Computed from Census of India, District Census Hand Book, 2001.

Note: Figures in bracket indicate percentage to total, and abbreviations used refer to the list of abbreviations.

Appendix II

Nearest Neighbour Distances of Settlements

Harishchandrapur-II Block

(2001)

Sl. No.	Name of the settlements	Name of the nearest settlement	Distance from the nearest settlement in cm. (on the map)	Distance from nearest settlement in km.* (on the ground)
1.	Jay Rampur	Bildaha	1.6	1.267
2.	Bildaha	Sharanpur	1.3	1.030
3.	Sharanpur	Bildaha	1.3	1.030
4.	Monaharpur	Chhatrak	1.8	1.426
5.	Hulaspur	Chhatrak	1.3	1.030
6.	Chhatrak	Hulaspur	1.3	1.030
7.	Kushol	Sayra	1.3	1.030
8.	Sayra	Kushol	1.3	1.030
9.	Darol	Sultan Nagar	1.6	1.267
10.	Sultan Nagar	Darol	1.6	1.267
11.	Chaksatan	Dahara	1.7	1.346
12.	Dakshin Mukundapur	Sultan Nagar	1.7	1.346
13.	Datian	Dahara	1.8	1.426
14.	Putia	Kankania	1.4	1.109
15.	Khanta	Sahapur	1.3	1.030
16.	Sahapur	Khanta	1.3	1.030
17.	Bashant Dhanipara	Raghabpur	1.3	1.030
18.	Raghabpur	Bashant Dhanipara	1.3	1.030
19.	Arjuna	Tetia	1.4	1.109
20.	Kankania	Putia	1.4	1.109
21.	Hariharpur	Betahal	1.6	1.267
22.	Talgram	Kankania	1.6	1.267
23.	Betahal	Talgram	1.5	1.188
24.	Sahara Bahara	Betahal	1.5	1.188
25.	Maharapara	Bhuna	1.2	0.950
26.	Sadlichak	Basudebpur	1.5	1.188
27.	Bhuna	Sikatani	1.0	0.792
28.	Nawapara	Bhuna	1.4	1.109
29.	Sikatani	Bhuna	1.0	0.792
30.	Basudebpur	Suryapura Tengurpura	1.4	1.109
31.	Uttar Kumedpur	Basudebpur	1.9	1.505
32.	Sikatani Inlis	Sikatani	1.2	0.950
33.	Suryapura	Sikatani Inlis	1.6	1.267

	Tengurpura			
34.	Tetia	Arjuna	1.4	1.109
35.	Samukha	Malior	1.3	1.030
36.	Malior	Samukha	1.3	1.030
37.	Jalalpur	Malior	1.7	1.346
38.	Dakshin Gouripur	Jalapur	1.9	1.505
39.	Talsur	Dakshin Gouripur	2.2	1.742
40.	Belsur	Talbhakuria	2.7	2.138
41.	Talbhakuria	Belsur	2.7	2.138
42.	Khopakati	Digri Inlis	1.8	1.426
43.	Digri Inlis	Khopakati	1.8	1.426
44.	Uttar Bhakuria	Dakshin Bhakuria	2.4	1.901
45.	Mihaghat	Uttar Bhakuria	2.8	2.218
46.	Talbangrua	Hardam Nagar	2.8	2.218
47.	Hardam Nagar	Bhairabpur	1.9	1.505
48.	Daulatpur	Malipakar	2.2	1.742
49.	Chithalia	Bansdol	1.8	1.426
50.	Ilam Milik	Ilam	0.6	0.475
51.	Uttar Bejpura	Ilam	0.7	0.554
52.	Ilam	Ilam Milik	0.6	0.475
53.	Bejpura	Dubol	2.0	1.584
54.	Maslandapur	Bejpura	2.1	1.663
55.	Bansdol	Dubol	1.3	1.030
56.	Dubol	Bansdol	1.3	1.030
57.	Latasi	Dubol	1.9	1.505
58.	Mali Pakar	Gauspur	2.0	1.584
59.	Gauspur	Malipakar	2.0	1.584
60.	Talgachhi	Kariali	2.7	2.138
61.	Bhairabpur	Hardam Nagar	1.9	1.505
62.	Daulat Nagar	Tal Bangrua	3.0	2.376
63.	Dakshin Bhakuria	Uttar Bhakuria	2.4	1.901
64.	Fatepur	Jagannathpur	3.0	2.376
65.	Jagannathpur	Bhairabpur	2.4	1.901
66.	Kariali	Mashaldaha	2.4	1.901
67.	Mashaldaha	Mohanpur	1.7	1.346
68.	Mohanpur	Mashaldaha	1.7	1.346
69.	Dahara	Chaksatan	1.7	1.346
70.	Degun	Jagannathpur	2.5	1.980
71.	Bhaluka	Par bhaluka	2.6	2.059
72.	Par bhaluka	Bhaluka	2.6	2.059
	Total = 72			99.157 Km.

*Based on scale 1 cm = 0.792 km.

(Contd....)

Computation of Nearest-Neighbour Distance:

$$\text{Density of Settlement (r)} = \frac{N}{A} = \frac{72}{217.2} = 0.331 \text{ per sq. km.}$$

$$\text{Observed Mean Distance } (d_0) = \frac{99.157}{72} = 1.377 \text{ km.}$$

$$\text{Expected Mean Distance } (d_e) = \frac{1}{2\sqrt{P}} = 0.869 \text{ km.}$$

$Rn = d_0/d_e = 1.584$ (value of N-N index which implies random pattern of settlements).

Appendix III

Technical Operation of Estimation of Median Population Threshold (MPT)

For the determination of Median Population Threshold of a function (F_1) among the group of settlements of different size class, the following table has been illustrated as an example. In the table the MPT of Higher Secondary School has been estimated in the study region where total settlements accounted at 1646 which are grouped into different strata (size class in term of number of population) for the present estimation. At the two lower stratum (settlements with population of <250 and 250-499) all settlements are without the function F_1, for the highest stratum (settlements with population more than 30,000 persons) all places have the function F_1. In between these two extremes the proportion 'without' declines and 'with' increases. Cumulative summing of the two columns give values for an index 'Ag' indicating absence of the function F_1 at this and greater levels and for an index Ps indicating presence of the function F_1 at this and smaller levels. Finally, P may be computed as the proportion of settlements with the function F_1 at each population size class of settlements as per the expression P = Ps x 100 / Ps + Ag. In the above table proportion P are given in the final row from where the median population threshold (PT_{50}) of higher secondary school may simply be delivered. It is observed that for the settlements of sixth stratum (population size group 5000-9999) have only 21.43 per cent and that for seventh stratum (population size group 10,000-29,999) the proportion (P) has risen to 61.19 per cent, so clearly the median population threshold (PT_{50}) lies somewhere between these two values (21.43 and 61.19).

(Contd...)

Determination of Median Population Threshold (PT_{50}) for Function F_1

Particulars of the functions	Population size class of settlements								
	<250	250-499	500-999	1000-1999	2000-4999	5000-9999	10000-29999	>30000	Total
Total number of inhabited settlements	189	280	360	354	316	111	34	02	1646
Settlements with function Higher Secondary School (F_1)	0	0	02	02	13	16	08	02	43
Settlements without function (F_1)	189	280	358	352	303	95	26	0	1603
Settlements with function F_1 absent at this and greater level (Ag)	1603	1414	1134	776	424	121	26	0	1603
Settlements with function F_1 present at this and smaller level (P_s)	0	0	02	04	17	33	41	43	43
Proportion (P) of settlements with F_1 present (%) P= (Ps x 100/Ps+Ag)	0	0	0.18	0.51	3.85	21.43	61.19 PT_{50} ↓	100	--

The estimated MPT for function Higher Secondary School is about 16481 populations based on the following computation:

$$MPT = MR_1 + (50 - A / B - A)(MR_2 - MR_1)$$

Where, MR_1 is mid-point of population size group of settlements preceding 50 per cent $P_s + A_g$,

MR_2 is mid-point of population size group of settlements succeeding the class of MR_1,

A is the 'P' value of the size group of settlements preceding the value of PT_{50}, and

B is the 'P' value of the size group of settlements succeeding the value of PT_{50}

$MR_1 = 7499.5$, $MR_2 = 19999.5$, $A = 21.43$ and $B = 61.19$,

Therefore, MPT = 16481

Appendix IV

Centrality Score of Central Places

Malda District

(2001)

Sl. No.	Name of the Central Places	Block	Centrality Score	Population
Sixth Hierarchical Order				
01	English Bazar	ENGB	9381.72	161,456
Fifth Hierarchical Order				
01	Singia	CHCL-I	2339.72	10,051
Fourth Hierarchical Order				
01	Uttar Harishchandrapur	HCPur-I	1691.75	12,962
02	Samshi	Ratua-I	1742.53	1,713
03	Old Malda	OLM	1857.50	623,959
Third Hiedrarchical Order				
01	Tulshihata	HCPur-I	956.31	3,509
02	Ratua	Ratua-I	985.86	4,685
03	Bahir Gachhi	Gazole	789.30	6,673
04	Rangabhita	Gazole	1278.35	4,423
05	Bamangola	BMNL	929.78	2,703
06	Habibpur	HBPur	1047.77	2,050
07	Manikchak	MNK	854.06	6,280
08	Baliadanga	KLK-I	1329.30	10,441
09	Bara Suzapur	KLK-I	795.01	12,292
10	Mothabari	KLK-II	1123.04	8,284
11	Baishnabnagar	KLK-III	931.73	11,525
Second Hierarchical Order				
01	Kusidha	HCPur-I	632.95	3,802
02	Bhingol	HCPur-I	254.10	2,483
03	Daulatpur	HCPur-II	370.80	7,393
04	Uttar Kumedpur	HCPur-II	256.57	4,955
05	Talgram	HCPur-II	236.51	4,058
06	Sadlichak	HCPur-II	243.62	2,796
07	Bhaluka	HCPur-II	385.89	5,986
08	Mashaldaha	HCPur-II	366.40	3,305
09	Swarupganj	CHCL-I	278.89	3,351
10	Serpur	CHCL-I	246.31	2,078
11	Kharba	CHCL-I	459.64	3,790
12	Chanchal	CHCL-I	324.43	4,708
13	Kaligram	CHCL-I	453.22	7,698
14	Sadarpur	CHCL-II	260.81	2,186
15	Malatipur	CHCL-II	523.25	1,167
16	Jalalpur	CHCL-II	246.06	4,359
17	Goalpara	CHCL-II	253.31	3,770
18	Rukundipur	Ratua-I	280.71	5,804
19	Bhado	Ratua-I	278.65	13,863

67	Palgachhi	KLK-III	296.73	7,197
68	Jagannathpur	KLK-III	389.32	12,241
69	Lakshmipur	KLK-III	445.02	13,149
70	Dariapur	KLK-III	249.23	5,111
71	Bedrabad	KLK-III	433.27	11,648
First Hierarchical Order				
01	Bijhat	HCPur-I	56.8	1,370
02	Bhatol	HCPur-I	51.89	1,750
03	Ramshimul	HCPur-I	67.2	2,373
04	Ranipura	HCPur-I	17.31	1,260
05	Bhaktipur	HCPur-I	37.81	1,030
06	Daula	HCPur-I	56.22	1,818
07	Chaupaldanga	HCPur-I	46.10	2,743
08	Saldaha	HCPur-I	20.78	1,882
09	Srichandrapur	HCPur-I	196.69	3,829
10	Salalpur	HCPur-I	23.79	1,437
11	Lakshmanpur	HCPur-I	31.25	2,650
12	Isadpur	HCPur-I	112.27	2,219
13	Kanua Bhabanipur	HCPur-I	132.09	1,015
14	Rangaipur	HCPur-I	24.77	5,212
15	Santoshpur	HCPur-I	158.21	1,620
16	Dakshin Mahendrapur	HCPur-I	27.66	4,380
17	Bangrua	HCPur-I	65.84	3,064
18	Bhabanipur	HCPur-I	47.87	1,904
19	Gangnadia	HCPur-I	51.03	3,327
20	Pipla Kasimpur	HCPur-I	180.40	2,972
21	Gaushpur	HCPur-II	62.41	1,315
22	Mali Pakar	HCPur-II	39.76	7,147
23	Chithalia	HCPur-II	66.93	2,549
24	Sultan Nagar	HCPur-II	174.14	2,891
25	Khanta	HCPur-II	206.62	4,021
26	Basudebpur	HCPur-II	46.46	1,432
27	Talbhakuria	HCPur-II	73.96	6,554
28	Daulat Nagar	HCPur-II	234.80	9,220
29	Mihaghat	HCPur-II	95.48	5,180
30	Belsur	HCPur-II	56.01	5,148
31	Malior	HCPur-II	180.39	7,354
32	Talbangrua	HCPur-II	75.43	6,469
33	Talgachhi	HCPur-II	166.65	6,097
34	Jagannathpur	HCPur-II	39.07	5,797
35	Kariali	HCPur-II	166.21	4,456
36	Mallikpara	CHCL-I	169.50	2,449
37	Nikhral	CHCL-I	170.70	2,048
38	Mahanandapur	CHCL-I	212.49	2,818
39	Paschim Bhagabanpur	CHCL-I	132.63	4,329
40	Gauria	CHCL-I	204.63	4,163
41	Sitalpur	CHCL-I	150.20	2,585

42	Dhanjana	CHCL-I	84.19	2,650
43	Naikanda	CHCL-I	65.47	1,545
44	Ashapur	CHCL-I	262.22	1,626
45	Kharba Gopalpur	CHCL-I	91.65	2,229
46	Arbara	CHCL-I	80.16	2,301
47	Bhagabatipur	CHCL-I	96.48	3,791
48	Nabagram	CHCL-I	118.92	6,062
49	Asrail	CHCL-I	31.79	2,458
50	Hatinda	CHCL-I	71.23	5,313
51	Sihipur	CHCL-I	66.22	2,066
52	Khelanpur	CHCL-I	104.70	2,418
53	Kanua	CHCL-I	88.01	2,467
54	Birasthali	CHCL-I	40.41	2,653
55	Paharpur	CHCL-I	62.19	3,056
56	Matiharpur	CHCL-I	172.78	3,100
57	Khanpur Hulaspur	CHCL-I	193.00	2,897
58	Bhakri	CHCL-II	40.37	3,591
59	Rampur	CHCL-II	26.17	1,715
60	Suti	CHCL-II	79.38	3,405
61	Kapsia	CHCL-II	70.74	2,527
62	Gourhanda Aladipur	CHCL-II	115.98	2,669
63	Enayat Nagar	CHCL-II	64.37	2,066
64	Jitarpur	CHCL-II	38.93	1,927
65	Belungaon	CHCL-II	154.07	2,685
66	Laliabari	CHCL-II	112.17	7,024
67	Aolagachhi Chaupkuria	CHCL-II	49.05	1,388
68	Choralmani	CHCL-II	121.98	1,662
69	Kandaram	CHCL-II	108.00	3,900
70	Chandua	CHCL-II	46.59	3,201
71	Kashipara	CHCL-II	103.24	1,346
72	Mahammadpur	CHCL-II	28.84	2,555
73	Bidyanandapur	CHCL-II	35.86	2,887
74	Mirzadpur	CHCL-II	95.07	2,243
75	Hazaratpur	CHCL-II	185.88	7,359
76	Gadai Maharajpur	Ratua-I	226.51	10,744
77	Kamalpur	Ratua-I	68.33	5,025
78	Maniknagar	Ratua-I	70.18	7,943
79	Bajitpur	Ratua-I	148.81	1,916
80	Balupur	Ratua-I	124.78	8,590
81	Debipur	Ratua-I	219.69	3,773
82	Jannagar	Ratua-I	54.86	3,094
83	Haripur Gopi	Ratua-I	121.61	2,705
84	Karbana	Ratua-I	147.75	3,324
85	Matiganj	Ratua-I	52.41	1,554
86	Chhabilpara	Ratua-I	92.08	5,544
87	Jadupur	Ratua-I	95.07	2,243
88	Bijra Bhita	Ratua-I	107.12	4,867

89	Khanpur	Ratua-I	70.29	2,435
90	Shibrampur	Ratua-I	78.22	1,078
91	Baikunthapur	Ratua-I	129.11	3,339
92	Alpara	Ratua-I	118.51	2,345
93	Baharal	Ratua-I	121.37	2,098
94	Bakhra	Ratua-I	24.79	2,839
95	Shripur	Ratua-II	153.63	2,192
96	Kheria	Ratua-II	44.05	2,846
97	Laskarpur	Ratua-II	50.28	2,958
98	Magura	Ratua-II	151.66	3,662
99	Magurra Khod	Ratua-II	88.25	4,590
100	Sambalpur	Ratua-II	176.06	7,214
101	Kumarganj	Ratua-II	193.41	5,279
102	Raninagar	Ratua-II	35.63	4,902
103	Maharajpur	Ratua-II	216.85	6,777
104	Rajapur	Ratua-II	46.06	4,745
105	Kadamtali	Ratua-II	29.0	5,003
106	Haripur	Ratua-II	156.80	3,027
107	Chandpur	Ratua-II	32.90	5,049
108	Bishanpur	Ratua-II	42.25	1,255
109	Mirdadpur	Ratua-II	93.84	3,316
110	Nijgan Araidanga	Ratua-II	94.09	3,800
111	Betahack Barna	Ratua-II	149.96	3,760
112	Nesta	Ratua-II	86.14	2,710
113	Uttar maricha Bishanpur	Ratua-II	38.43	1,863
114	Gobarjana	Ratua-II	62.45	2,813
115	Nasipur	Ratua-II	228.66	5,084
116	Khailsana	Ratua-II	95.63	1,272
117	Alal	Gazole	132.25	1,601
118	Rajaram Chak	Gazole	127.17	4,447
119	Mahakal Bona	Gazole	38.30	1,982
120	Muria Kunda	Gazole	106.41	1,965
121	Akalpur	Gazole	57.22	2,576
122	Saharol	Gazole	48.44	3,172
123	Arazi Deharul	Gazole	150.57	4,877
124	Ray Khan dighi	Gazole	40.11	2,312
125	Kailabad	Gazole	85.22	2,883
126	Alinagar	Gazole	135.25	4,136
127	Kutub Sahar	Gazole	96.29	5,621
128	Khord Babupur	Gazole	105.23	3,185
129	Adina	Gazole	60.47	5,738
130	Barijpur	Gazole	105.95	3,921
131	Gazole	Gazole	137.52	3,324
132	Kadubari	Gazole	41.97	1,854
133	Musidhap	Gazole	179.73	1,532
134	Arazi Mishrabati	Gazole	54.45	2,437
135	Bade Mayua	Gazole	99.44	6,203

136	Mayua	Gazole	120.42	2,860
137	Katua	Gazole	172.44	1,261
138	Uttar Naogram	Gazole	114.41	1,101
139	Lakshmipur	Gazole	169.83	1,532
140	Dhaoyail	Gazole	109.81	1,129
141	Chak Nagar	Gazole	58.01	1,610
142	Duba Khokasn	Gazole	84.27	4,040
143	Emam Nagar	Gazole	93.33	2,961
144	Salaidanga	Gazole	133.03	1,281
145	Ahil	Gazole	185.32	1,041
146	Dohail	Gazole	50.13	1,043
147	Karja Danga	Gazole	52.93	1,226
148	Krihnapur	Gazole	44.12	2,613
149	Arazi Jalsa	Gazole	139.29	3,663
150	Mohammadpur	BMNL	159.84	1,989
151	Gobindapur	BMNL	172.44	1,044
152	Dhamair	BMNL	53.48	1,870
153	Dharma Danga	BMNL	123.45	1,777
154	Jagdala	BMNL	120.03	1,001
155	Bhadreshwar	BMNL	60.0	1,248
156	Kamardanga	BMNL	98.4	1,035
157	Mirzapur	BMNL	144.68	2,631
158	Salalpur	BMNL	188.12	3,771
159	Khiripara	BMNL	40.13	1,020
160	Ashrafpur	BMNL	95.68	1,421
161	Chhatia	BMNL	77.85	1,853
162	Nabab Nagar	BMNL	224.31	3,586
163	Khutadaha	BMNL	181.41	3,469
164	Adatala	BMNL	78.43	2,571
165	Rahutara	HB Pur	59.38	1,035
166	Rajarampur	HB Pur	126.46	2,009
167	Pannapur	HB Pur	139.97	1,316
168	Chakli	HB Pur	54.03	3,507
169	Jagajjiban pur	HB Pur	217.43	2,928
170	Harish Chandra pur	HB Pur	77.97	2,826
171	Khantirka	HB Pur	70.65	1,010
172	Baksinagar	HB Pur	172.35	6,880
173	Jadabnagar	HB Pur	49.2	2,360
174	Rishipur	HB Pur	102.44	2,050
175	Dakshin Chandpur	HB Pur	233.77	3,405
176	Tilashan	HB Pur	136.67	3,058
177	Dakshin Brindabanbati	HB Pur	164.47	3,957
178	Balarampur	OLM	104.79	3,284
179	Barkol	OLM	87.29	3,166
180	Mahish Bathani	OLM	72.23	4,508
181	Rahut Gaon	OLM	86.29	1,825
182	Meherpur	OLM	108.32	1,727

183	Kalvari	OLM	66.97	5,455
184	Jhangra	OLM	174.53	5,792
185	Chhatianmor	OLM	116.49	4,524
186	Nageshwarpur	OLM	117.49	3,219
187	Sahapur	OLM	209.30	7,581
188	Adampur	OLM	76.45	2,724
189	Madia	ENGB	55.27	2,933
190	Bhabanipur	ENGB	67.24	10,261
191	Khaskol Chandipur	ENGB	44.44	8,793
192	Afgama	ENGB	32.21	5,607
193	Basudebpur	ENGB	51.32	2,697
194	Phulbaria	ENGB	206.68	4,561
195	Nagharia	ENGB	78.92	5,516
196	Sanatala	ENGB	176.08	9,107
197	Daulatpur	ENGB	122.85	2,847
198	Sahazalalpur	ENGB	85.22	2,296
199	Uttar Lakshmipur	ENGB	82.51	3,005
200	Nima Sarai	ENGB	57.66	2,396
201	Jot	ENGB	59.50	1,340
202	Bagbari	ENGB	38.04	6,935
203	Madapur	ENGB	125.33	6,916
204	Naoda Bazar	ENGB	27.42	1,622
205	Chandipur	ENGB	180.69	1,794
206	Gopalpur	ENGB	170.53	2,065
207	Bara Phulbari	ENGB	93.83	3,469
208	Tiakati	ENGB	218.31	3,558
209	Bholanathpur	ENGB	84.48	1,269
210	Uttar Chandipur	MNK	119.89	7,035
211	Paschim Chandipur	MNK	185.81	6,761
212	Sukshena	MNK	77.50	5,155
213	Paschim Narayanpur	MNK	186.59	4,099
214	Narayanpur	MNK	42.29	2,299
215	Karia Sultanpur	MNK	76.68	2,560
216	Chandipur	MNK	190.18	13,325
217	Nazirpur	MNK	97.70	2,927
218	Niranjanpur	MNK	45.43	1,792
219	Khartala	MNK	197.25	2,672
220	Nurpur	MNK	231.23	11,320
221	Tiarpara	MNK	26.61	1,454
222	Lalbathani	MNK	157.67	3,313
223	Anathpur	MNK	38.04	1,518
224	Lakshmipur	MNK	27.42	2,664
225	Porba Saidpur	MNK	111.83	5,424
226	Islampur	MNK	111.53	3,147
227	Salabatganj	MNK	73.09	4,114
228	Chauki Mirdadpur	MNK	162.96	6,831
229	Dharampur	MNK	79.20	2,798

230	Alipur	KLK-I	72.40	12,864
231	Maheshpur	KLK-I	165.32	8,155
232	Khaltipur	KLK-I	181.59	4,773
233	Bahadurpur	KLK-I	102.69	6,722
234	Silampur	KLK-I	154.70	10,114
235	Jotparan	KLK-I	79.82	2,725
236	Alinagar	KLK-I	109.03	7,957
237	Nabinagar	KLI-I	64.91	6,762
238	Dalugram	KLI-I	121.60	6,120
239	Bakharpur	KLI-I	104.29	9,339
240	Madhugram	KLI-I	170.28	1,029
241	Nazirpur	KLI-I	158.59	6,954
242	Gayesbari	KLI-I	219.21	8,076
243	Azimpur	KLI-I	77.95	9,357
244	Jalalpur	KLI-I	211.87	4,298
245	Bamangram	KLI-I	182.55	10,779
246	Jalvabadhal	KLI-I	80.69	3,976
247	Majumpur	KLI-I	72.04	7,303
248	Kadamtala	KLI-I	128.19	4,708
249	Palash Gachhi	KLI-II	110.05	13,832
250	Kankribandha, Jhaubana	KLI-II	95.41	5,604
251	Jotkasturi	KLI-II	118.80	4,491
252	Shrighar	KLI-II	129.87	3,801
253	Nayagram	KLI-II	61.38	6,148
254	Jot Ananta	KLI-II	216.74	7,869
255	Sadipur	KLI-II	117.15	4,785
256	Uttar Mohanpur	KLI-II	39.04	1,047
257	Jot Gopal Kagmari	KLI-II	193.55	10,137
258	Meherapur	KLI-II	180.83	3,298
259	Ganga Prasad	KLI-II	204.19	5,387
260	Mostafapur	KLI-II	153.83	1,507
261	Birahimpur	KLI-II	198.38	3,192
262	Debipur	KLI-II	34.05	2,417
263	Tap Protappur	KLI-II	91.08	6,388
264	Chari Anantapur	KLI-III	115.76	17,586
265	Bholai chak	KLI-III	119.83	2,483
266	Sahabazpur	KLI-III	171.48	10,652
267	Sahilapur	KLI-III	167.51	2,592
268	Krishnapur	KLI-III	60.69	14,007
269	Suzapur Mandi	KLI-III	106.13	7,213
270	Jayenpur	KLI-III	172.06	5,085
271	Nurnagar	KLI-III	71.44	1,076
272	Nandalalpur	KLI-III	39.7	5,401
273	Bhagabanpur	KLI-III	106.83	13,131
274	Par Deonapur	KLI-III	96.19	12,156

Source: Computed and compiled by author.

GLOSSARY

Aman	Winter rice.
Aus	Summer rice.
Barind	Higher elevated area.
Bat	A big size of tree.
Beel	A shallow depression on land filled with water.
Char	Deposition of sand and mud made by river.
Diara	Alluvial region formed due to the deposition made by fluvial action.
Doba	Low lying area subject to water stagnation.
Gram Panchayat	Village Council.
Jungle	A forest mixed with scrubs and trees.
Kal Baisakhi	Local atmospheric disturbance formed due to excessive heating of earth surface causes thunder storm.
Kharif	Summer crop season in India.
Mauza	A revenue village or settlement.
Neem	A tropical tree.
Pakur	A type of tree.
Pipal	A common deciduous tree.
Pucca	Metalled.
Rabi	Winter crop season in India.
Sal	A type of tree.
Simul	A common deciduous tree.
Tal	Low lying region.
Usar	Saline-alkaline soil.

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